AMERICAN MACHINIST

A JOURNAL FOR MACHINISTS, ENGINEERS, FOUNDERS, BOILER MAKERS, PATTERN MAKERS AND BLACKSMITHS.

VOL. 10, No. 13 WEEKLY. | NEW YORK, MARCH 26, 1887. | $2.50 per Annum. SINGLE COPIES, 5 CENTS.

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ENTERED AT POST OFFICE, NEW YORK, AS SECOND CLASS MATTER.

Moulding A Web Pulley.

BY GEO. O. VAIR.

The firm I am connected with makes a great many web pulleys, mostly used for saw arbors, and friction. Where you can get one moulder who can make all sizes of these pulleys free from flaws, you will find a dozen that cannot; at least so my experience goes. All the trouble generally arises from improper venting of the mould, or ramming. I have seen moulders lose web pulleys by scabbing; and the next one they would mould, they would ram the web so light, that it would be from $\frac{1}{2}''$ to $\frac{3}{4}''$ thicker than the pattern, because they imagined it was too hard ramming that caused their former mishap. But in my way of thinking, proper venting on this kind of pulley is of as much importance as correct ramming, although Matthew Wiard says the vent wire should be seldom if ever used.

The sectional view of mould, herewith shown, represents a method of venting those pulleys which I have used with excellent results.

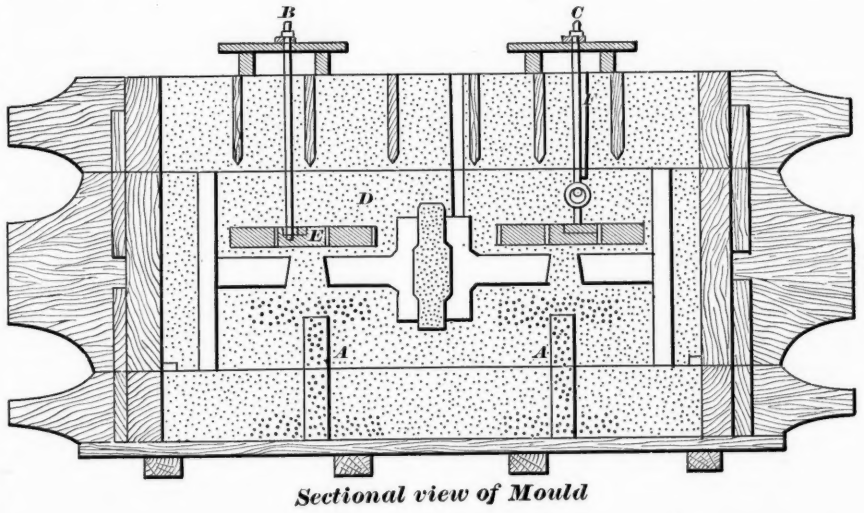
Of course I don't advocate it on all sizes of pulleys, but for pulleys over 30″ in diameter, and over 20″ face, I think it right. On narrow-faced pulleys the bottom cinder bed will answer all purposes for carrying off the vent. Some foundries use dry sand cores altogether, to form the center, and ram the cheek up in green sand.

After putting one off-set on the bottom board, we put in a bed of cinders, on which are placed three or four large gate pins, long enough to reach up to whatever height you want the second bed of cinders, which is usually from 3″ to 4″ below the face of the web. After ramming up to that point draw out the pins and fill the channels with cinders, to connect the lower and upper cinder beds, as seen at *A*. After having put in your top cinder bed and rammed up to where you want to put in your web, take a wire and vent well into top cinder bed. I think the intelligent moulder will see at a glance that this method of venting allows of an immediate escape of the gases from the face of the web, thereby lessening the chances of scabs.

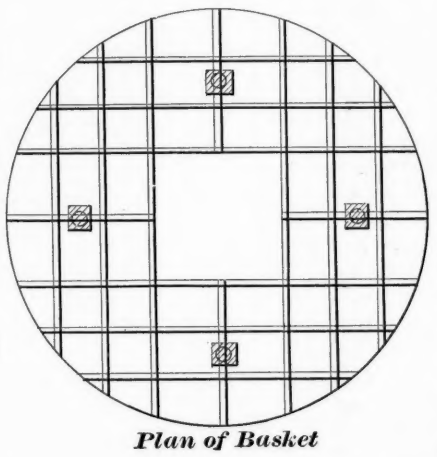
In moulding the above pulley, after it is drawn up 1″ or 2″ above the web, the iron basket is set in on about $\frac{3}{4}''$ of sand; the rim is then drawn up to right depth of face, the cope is rammed up and lifted off, rim pattern is then drawn out of the mould, the cope replaced, so as to allow of tightening rods, *B* and *C*, which support top core *D*.

At *B* and *C* are shown two styles of rods; *B* has a thread cut on both ends, and screws into a nut cast in basket *E*; whereas at *C* part of the rod, or lifting hook, is cast into basket. The vacant space *F*, which is formed by a gate pin, is to allow of the cope being replaced without taking out the lifting hook, as it gives a clearance.

If thought best, this pulley can be made on the same plan all in the floor by using gas pipe to carry off the vent from the bottom cinder bed.



Sectional view of Mould

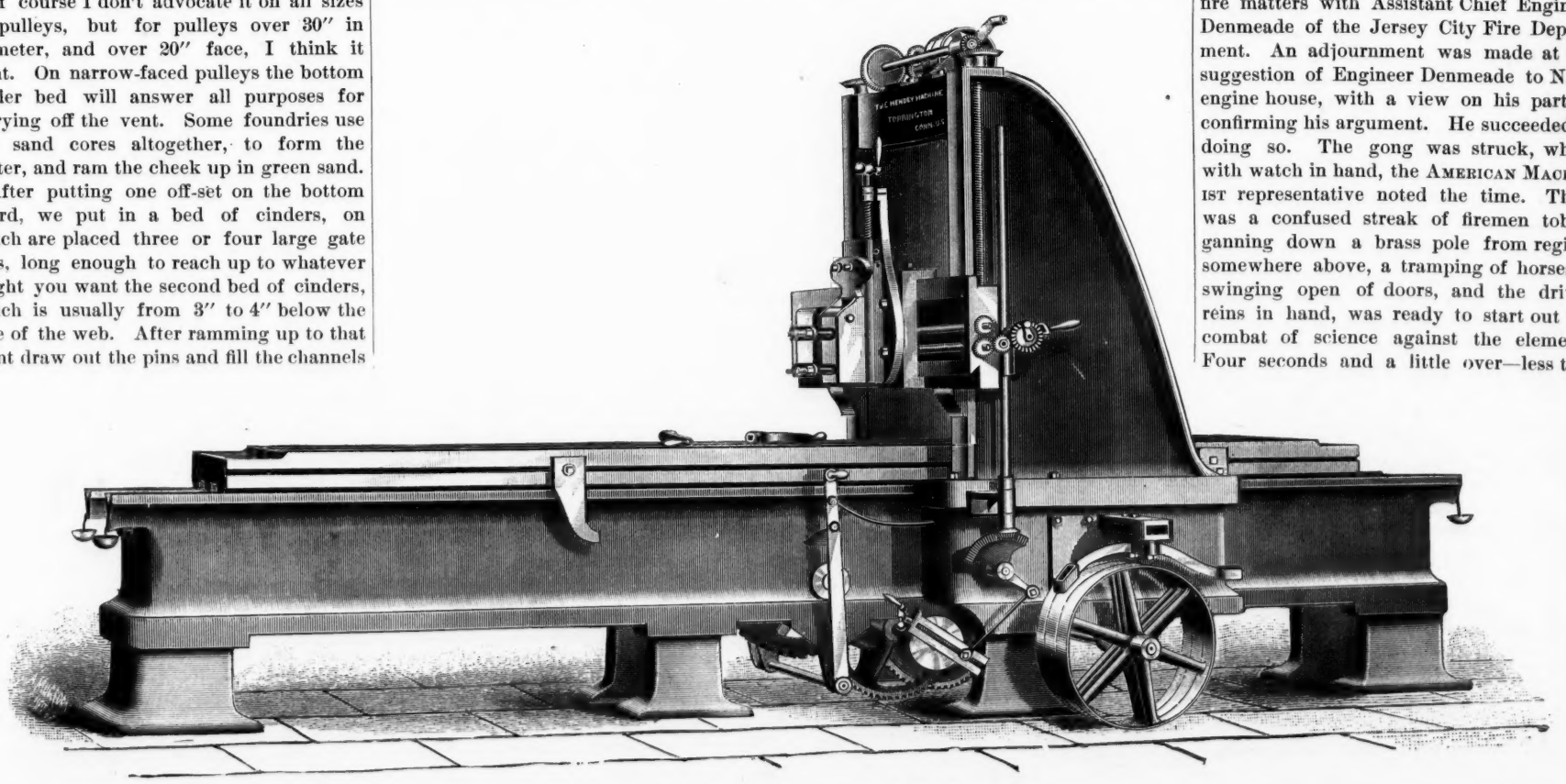


Plan of Basket

Thirty Inch by Thirty Inch by Ten Foot Planer.

The planer which we illustrate herewith is made by the Hendey Machine Company, Torrington, Conn. It is a substantial machine of its kind, and carefully constructed, all sliding bearing surfaces being fitted by scraping.

The feed is automatic in all directions. The slide on the head can be run up or down by the handle on either end of the cross-feed rod that moves the vertical feed.



THIRTY INCH BY THIRTY INCH BY TEN FOOT PLANER.

The feed is adjusted by means of a screw, and is operated by a splined vertical shaft. The motion can be reversed from either side by means of a hand lever. Extra legs under the uprights serve to add rigidity.

The table has three bolt slots planed from solid stock; the holes in table are also drilled and reamed to uniform size.

The racks and gears are cut; the feed screws are steel, with square threads; and such parts as are liable to abrasion are case-hardened.

The belt-shifter moves one belt at a time, thus doing away with the disagreeable noise incident upon shifting both belts at once.

A new bill in England relating to the payment of wages in mines provides that pay-days shall be at least as often as once in two weeks, prohibits the practice of keeping back a month's wages, and provides at the winding up of a company's affairs from any cause whatever that miners' wages shall have precedence of all liabilities.

Machinery vs. Firemen.

In these days of machinery adapted to rapid production and reproduction we are apt to lose sight of the fact that rapidity of human action has also made great advances, incited thereto by the high pressure of the times. This was demonstrated to our satisfaction as the outcome of a discussion of fire matters with Assistant Chief Engineer Denmeade of the Jersey City Fire Department. An adjournment was made at the suggestion of Engineer Denmeade to No. 3 engine house, with a view on his part of confirming his argument. He succeeded in doing so. The gong was struck, while, with watch in hand, the AMERICAN MACHINIST representative noted the time. There was a confused streak of firemen tobogganning down a brass pole from regions somewhere above, a tramping of horses, a swinging open of doors, and the driver, reins in hand, was ready to start out to a combat of science against the elements. Four seconds and a little over—less than five—was the time. This was repeated with the same results. It should be noted that the horses were 55 feet away from the pole, properly fastened in their stalls, when the gong sounded.

One hardly knows whether to admire

most the self-training of the men to such alertness, or the equally perfect training of the horses. The latter is accomplished entirely by kindness; in fact there is absolute sympathy between men and horses, the last mentioned being quite as enthusiastic firemen as the former. As the time noted is less than that required to sound the location of the box, there is an impatient waiting of a *second or two* after getting ready to start out. Looking back to the days of the old hand tubs, or even to t earlier days of steamers, the advancement in the way of time saved is equal to almost any advancement made in machinery in the same time.

Practical Drawing.

By J. G. A. Meyer.

TWENTIETH PAPER.

Problem 31.

190. TO CONSTRUCT A REGULAR HEXAGON WHEN THE LENGTH OF ONE OF ITS SIDES IS GIVEN.

Fig. 144. Let the line *A B* be the given length of one side of a regular hexagon; it is required to construct on this line the hexagon.

In geometry it is proved that the side of a regular hexagon is equal to the radius of the circumscribed circle. Consequently, in our problem the radius of the circumscribed circle must be equal to the length of the line *A B*. From the end *A* of the given line as a center, and with a radius equal to the given line *A B*, describe a short arc *h i*. From the end *B* of the given line as a center, and with the same radius as before, describe another short arc cutting the arc *h i* in the point *C*, this point *C* will be the center of the circumscribed circle. From *C* as a center, and with a radius equal to the length of the line *A B*, describe a circle *A B F*. From the point *B* as a center, and with a radius equal to the line *A B*, describe a short arc, cutting the circumference *A B F* in the point *D;* join the points *B* and *D* by a straight line *B D*, which will be another side of the required hexagon. In a similar manner lay off in succession the chords *D E*, *E F*, etc. If this construction is correctly made the last chord *G A* will meet the side *A B* at the point *A;* these chords will be the sides, and form the required hexagon.

Directions.—In the space marked Prob. 31 lay off a line 7 inches long—3 inch scale—on this line construct the regular hexagon according to instructions given in this article.

Draftsman's Method.—If the regular hexagon, which is to be drawn, is very large, follow the geometrical construction given If the hexagon is small—as will often happen in drawings for machinery, follow the draftsman's methods similar to those in Arts. 194 and 195.

Problem 32.

191. 1ST. TO INSCRIBE A REGULAR HEXAGON IN A GIVEN CIRCLE. 2D. TO CIRCUMSCRIBE A SIMILAR HEXAGON ABOUT THE SAME CIRCLE.

Fig. 145. Let *O Q S* be the given circle; it is required to inscribe a regular hexagon in this circle.

In Art. 190 we have seen that the side of a hexagon is equal to the radius of the circle in which the hexagon is inscribed. Therefore, to inscribe a regular hexagon we have only to lay off six chords in succession, each equal to the radius of the given circle; hence, divide the circumference into six equal parts, join the points of division *A B D*, etc., by straight lines, and the resulting figure will be the inscribed hexagon.

192. To circumscribe a regular hexagon about the same circle, when the sides of the circumscribed hexagon are to be parallel to the sides of the inscribed hexagon.

Fig. 145. Bisect the arcs which are subtended by the sides of the inscribed hexagon, and thus obtaining the points *O P Q* etc.; through these points draw straight lines tangent to the circle, as *L K*, *K J*, *J I*, etc., and let these tangents intersect, the resulting figure will be the hexagon required.

193. When a regular hexagon is to be circumscribed about a given circle, without any regard to an inscribed hexagon, we proceed in the following manner:

Fig. 145. Divide the given circumference into six equal parts, and thus obtaining the points *O P Q*, etc.; through these points draw tangents, and allow these to intersect. The resulting figure will be the hexagon required.

Directions.—In the space marked Prob. 32 describe a circle whose diameter is 12 inches, by a 3-inch scale. In this circle inscribe a hexagon, and about the same circle circumscribe a similar hexagon, with their sides parallel to each other, according to the geometrical method given in this article.

194. *Draftsman's Method.*—In machine drawings it frequently happens that we have to draw regular hexagons, which are to represent hexagon nuts. If for this purpose we adopt the geometrical construction just given, too much time would be required; and, also, it is very questionable whether the result would be as accurate and satisfactory as desired. Hence the draftsman employs the following method, by which a regular hexagon can be very quickly and accurately drawn.

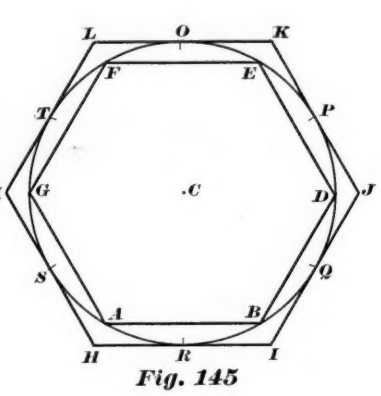


Fig. 145

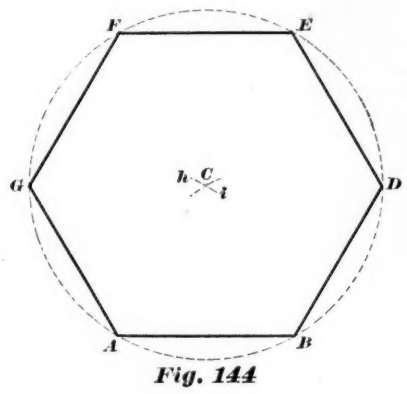


Fig. 144

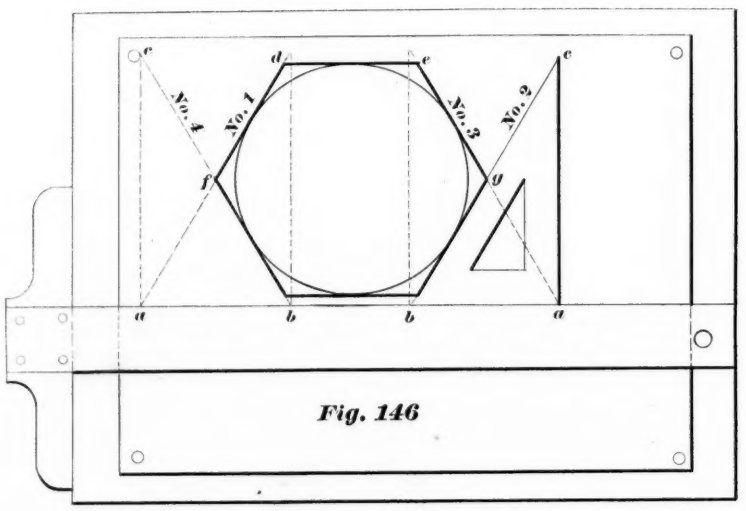


Fig. 146

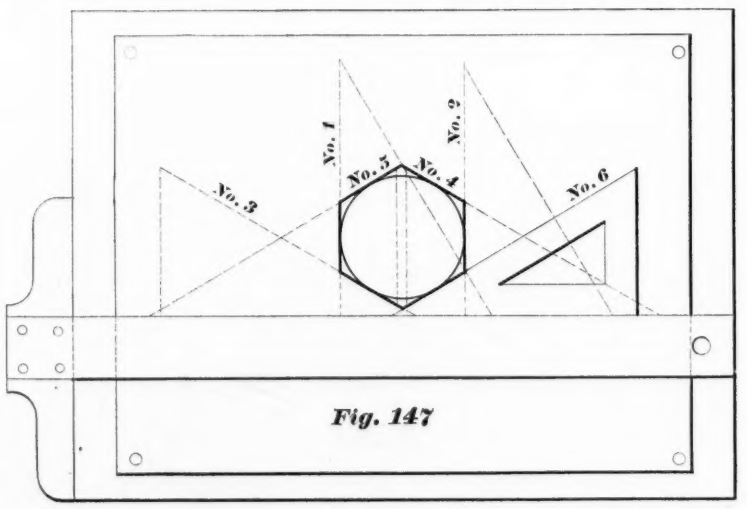


Fig. 147

PRACTICAL DRAWING.

Fig. 146. Let it be required to draw a hexagon nut in a position in which two of its sides are horizontal, as shown in the figure. Describe a circle whose diameter is equal to the distance between any two of its parallel sides. Then place the T square, with its head held firmly against the edge of the drawing board, in a position in which its edge will touch the circumference in the upper point, and draw the tangent *d e*. Next move the T square in a position with its edge touching a point in the circumference opposite to the side *d e*, and then draw the tangent parallel to the side *d e*. Now place the T square in any convenient position with its head held firmly against the edge of the drawing board; and with the set square, such as shown in Fig. 48, draw the remaining four sides, thus: Place the set square in the position marked No. 1, in which its edge *a b* will rest against the edge of the T square, and the edge *b c* touch one point in the circumference, and draw the tangent *d f*, cutting *d e* at the point *d;* now move the set square in the position marked No. 2 and draw a tangent parallel to *d f*. Reverse the set square, place it in position No. 3 and draw the tangent *e g;* and lastly, place the set square in position No. 4 and draw the tangent parallel to *e g*. Of course all these tangents must be drawn sufficiently long, so that they will intersect; then the tangents limited by their points of intersection will represent the sides of the nut.

195. If two sides of the nut are to be drawn vertically, then use the T and set square in a manner as shown in Fig. 147, which is sufficiently plain without further explanation. But it must be remembered, that in both cases, while drawing the sides of the nut, the head of the T square must be held firmly against the edge of the drawing board, and the set square against the edge of the T square as shown in the figures, otherwise, a mean looking nut will be the result.

The young student will be greatly benefited by drawing a number of nuts of different sizes on a separate piece of paper, according to the draftsman's method as illustrated in Figs. 146 and 147.

196. But here the reader may ask: What is the correct diameter of the circle about which the sides of the nut are to be circumscribed? In this country the following rule is nearly universally adopted: The standard width between any two parallel sides of a hexagon nut—which is equal to the diameter of the circle to be drawn—is $1\frac{1}{2}$ times the diameter of the bolt plus $\frac{1}{8}$ of an inch; thus: If we wish to draw a nut suitable for $\frac{1}{2}$ of an inch bolt, we then draw a circle whose diameter is equal to $\frac{1}{2}\times 1\frac{1}{2}+\frac{1}{8}''=\frac{7}{8}$ of an inch; again, if we wish to draw a nut suitable for $\frac{3}{4}$ of an inch bolt, we draw a circle whose diameter is equal to $\frac{3}{4}\times 1\frac{1}{2}+\frac{1}{8}''$ $=1\frac{1}{4}$ inch; and about these circles the sides of the nut are circumscribed.

197. If a circle about which the regular hexagon is to be circumscribed is too large for the set square, or if a large circle about which the hexagon is to be circumscribed is drawn on the floor, the draftsman adopts the geometrical method for circumscribing the hexagon as explained in Art. 192.

The Mechanics of Making a Daily Newspaper.

When the early reader studies his favorite morning newspaper, that comes to him with the regularity of daylight or the indications of his Waterbury watch, how often does he think of the mechanical manipulations and inventions that make possible the supplying of some millions of people with their morning mental fuel; their means of intellectually firing up for the next run, or till they get a fresh supply of similar potential energy? Some morning if he should miss his paper would it occur to him that, instead of the editors, reporters and correspondents being in league to deprive him of that which he had come to claim a sort of proprietorship in, there might be something amiss with mechanical appliances, something that made it impossible to manufacture his paper; that this might occur just as naturally as the machinery in the mill occasionally stopped business there, or as naturally as the machinery in any other manufactory refused to let manufacturing proceed for a day or two? A newspaper appears to the average reader like an indefinite quantity of printer's ink spread more or less artistically over white paper, and is read without much thought of the almost infinitely small fractional part it represents of the total edition of which it is unity, or the suspicion of an idea that the mechanical problems involved in its regular daily appearance are not the least noteworthy things connected with it.

Possibly it was some such philosophizing as the above that led three representatives of the American Machinist, one of whom was the writer, to investigate by the midnight electric light some of the purely mechanical operations of getting ready for early morning delivery a recent Sunday edition of the *World*, the edition consisting of 256,610 papers of twenty-eight pages each.

As getting out a daily newspaper is a good deal like any question of manufacturing, the first thought is naturally of raw material, "How much stock," was asked of the genially busy foreman of the press room, "will be used to-night?"

"Fifty tons of paper and 1,800 pounds of ink," was the reply.

Add to this fourteen tons of metal melted and poured into stereotype plates, and a fair idea is had of the material used in manufacturing, strictly on the duplicate plan, the more than one and three-quarter million distinct pieces that put together make up the edition referred to. Doing this manufacturing every day (or a little less, for the Sunday editions of New York dailies are always somewhat larger than the week-day editions) suggests mechanical appliances not liable to failure, as well as system and method in their use. Fifty tons of paper daily hints at monopolizing the product of a respectably sized paper mill. It is a good deal of raw material, worked up into small pieces, and in machine shop parlance "finished all over."

Away up as near the sky as it is practicable to get in the *World* building one hundred and fifty compositors and proof-

readers were at work getting the forms ready for stereotyping. Type setting is peculiarly mechanical work. There might be a question when it comes to proof-reading, but the writer, who was intent on magnifying the mechanics of newspaper making, argued that the veteran proof-reader forbids needlessly changing the geography of the more important parts of the world and uselessly improving the orthography of Webster and Worcester more by mechanical instinct than by virtue of any other faculty. Some time he learned certain things by mental processes, but this didn't make a proof-reader of him; that came by the mechanical education of the eye to see things that are wrong, and finds expression in the mechanical sweep of the pen that builds hieroglyphics calling for the doing or undoing of something.

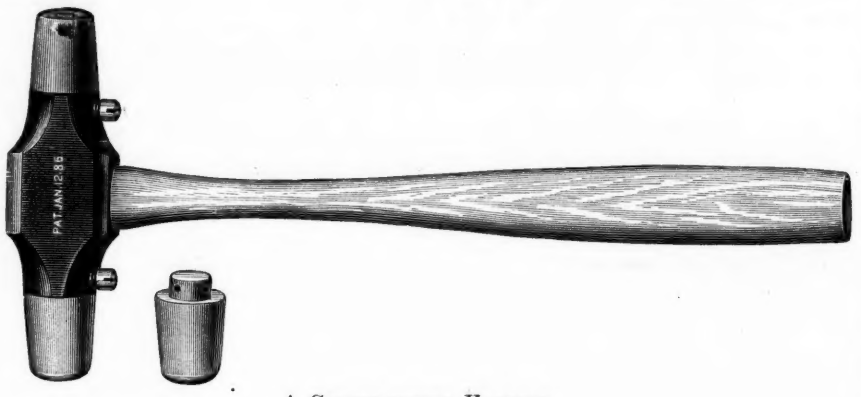
From the composing room a form goes down, and to the stereotyping room by the way of an elevator and over-head railway. Then it goes under a screw press for the impression, the plate is cast, cut "type high" by a single sweep of a cutter that looks like an exaggerated planer knife, beveled on the edges and otherwise trimmed to fit the cylinder, all by the use of machinery, and almost to the annihilation of time.

In the press room are five double perfecting presses, three of them being inserting presses in which a supplement can be printed as a sort of side issue, inserted in the regular eight page paper and the whole folded and delivered. The double presses will print two eight page papers at once, a double press having a possible capacity of twenty-four thousand eight page papers per hour. They are not, however, generally run at that speed. There are also in the press room three single presses.

The modern rapid printing press is perhaps the finest example known of the application of the principles of mechanics to machine construction. On one of these huge double presses a roll of paper more than three feet in diameter and six feet long, weighing upwards of three-quarters of a ton is mounted at one end, and from this the paper is unwound at a speed that keeps the steadily decreasing roll spinning around like a car wheel. Between the first type and impression cylinders goes this six foot ribbon of paper, where one side is printed, circuiting around, the printed side being blotted and the reverse side printed from the second type cylinder, turning, cutting, looping, it goes on till finally it appears at the other end in two continuous streams of eight page papers pasted and folded ready for delivery. It is bewildering and substantially useless to attempt to follow consecutively the mechanical operations involved in this. Unless one has some previous knowledge of the mechanism and its operation he will see a continuous streak of white paper going in near one end of the machine, faster than the eye can intelligbly follow its progress, disappearing here and revealing itself there, then he will go to the other end of the machine and see two streams of finished papers coming out, and take the rest mainly by faith. Notwithstanding these machines, which simulate human intelligence, are as nearly automatic in their actions as it is possible to make machinery, the pressman stands at his post very much as the locomotive engineer does, the resemblance being heightened by the fact that one hand is on a lever with a notched quadrant very like the reverse lever which the engineer handles while his eye follows the stream of paper passing into the press as the engineer's eye follows the rail over which his engine is passing.

The five double presses are equal to ten single perfecting presses, which, with the three single presses, make the equivalent of thirteen single presses, and these again with three single presses in an overflow establishment in Brooklyn, swells the number to sixteen single perfecting presses, which were all at work on this edition of the *World*. From the press room elevators are moving papers up to the floors above for shipment; machinery is at work in a room adjoining the press room, dampening paper and rewinding it in long rolls for use on the double presses; upstairs the mechanics of engraving is being attended to; cranes are lifting the great rolls of paper to the presses—in a word, it is machines and machinery everywhere. Finally, a pair of 14″x38″ Watts-Campbell-Corliss engines and four hundred men do this mechanical work.

The writer went home in the early morning hours, without attempting to come at all the mechanics of the case; but he had taken on a fair supply of printers' ink, and taken in enough of the subject to be more than ever convinced that running a great morning paper was a good-sized mechanical achievement.



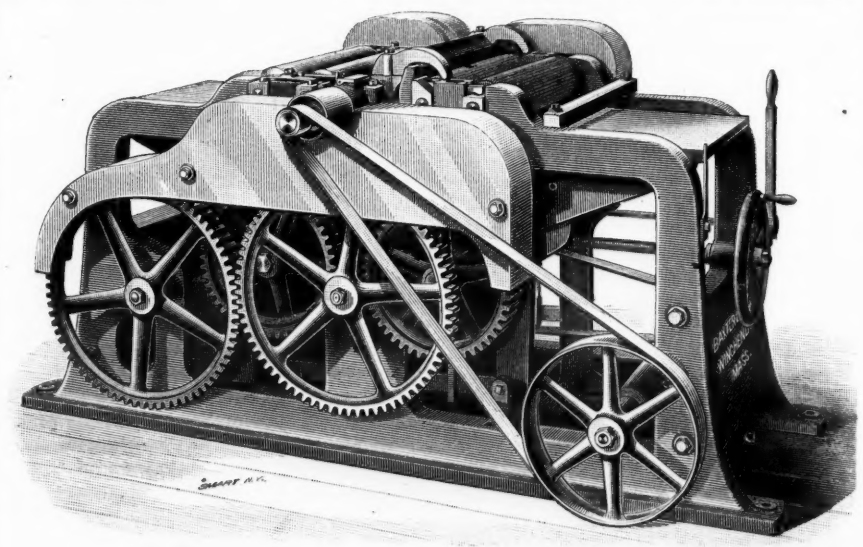
A COPPER-TIPPED HAMMER.

A Copper-tipped Hammer.

The cut herewith shown represents a new style of copper-tipped hammer for machinists and engineers' use in hammering finished work without marring it.

The hammer head is made of malleable iron, the ends of which are provided with a socket, into which the copper tips are fitted and held in position by a set-screw. In case one corner of the tip becomes battered more than the other, it may be rotated by loosening the set-screw until the whole tip has been battered; then it can be removed, hammered into shape and readjusted. The tips are made of solid bar pure copper (not cast). Extra tips are furnished at slight cost, to replace those worn out. A wrought-iron button in the head makes a solid foundation, and prevents driving tip through.

This hammer is being placed upon the market by Montgomery & Co., 105 Fulton street, New York.



EIGHT-ROLL PLANING MACHINE.

Eight-Roll Planing Machine.

The object in bringing out this machine was to provide a machine of strong feeding capacity without complicated and troublesome gearing.

The machine has eight feed rolls, five inches in diameter, all of which are positively driven by a newly arranged system of gearing, which is very direct in its action, and has no tendency to lift or depress the feed rolls when a greater or less power is required to carry the lumber forward. Th gearing is all protected by substantial cast-iron hoods or covers.

The roll shafts are all made of machinery steel. The cylinder is made of best tool steel, which is stiffer and of more uniform temper than common cast-steel; consequently the journals are less liable to spring and heat. The journal boxes for the cylinder are ten inches long, two inches diameter, and self-oiling.

The pulleys at each end of the cylinder are four and one-half inches diameter, and six inch face, and can be belted from any direction. The table is supported in a rigid manner on long inclined planes, which are moved by a screw and hand-wheel; one revolution of the wheel causes the table to rise or fall one-eighth of an inch.

All parts being fitted to standard gauges, are interchangeable. Before leaving the shop each machine is put in running condition and thoroughly tested. The sizes of the machines vary two inches, and are made from twenty-four to forty-eight inches wide. Lumber can be planed from one-sixteenth to seven inches in thickness. The 24-inch machine weighs 4,800 lbs.

The manufacturer is Baxter D. Whitney, Winchendon, Mass.

Improved Catalogues.

Catalogues of machinery and manufactured articles of all varieties present a decided improvement over the average kind printed and distributed four or five years ago. Most of them are now embellished by good wood engravings and printed on smooth calendered paper in a style that used to be considered unnecessarily elaborate. The manufacturers have become convinced that purchasers usually have critical tastes, which they exercise not only upon the articles they buy, but upon the manner in which they are presented for sale. We see, at this late day comparatively few catalogues filled with cheap process cuts and printed so as to give the whole job an appearance as though it were done in a blacksmith shop.

The preparation of the literary part of catalogues also shows a higher estimation of its utility to the parties offering the goods for sale. Boastful phrases and sentences no longer constitute the main portion of the printed matter in average catalogues. It has been found that such rot repels rather than attracts buyers. Of course there are catalogues now issued on the old scrimping and bragging plan, but they are growing few, and the brush of competition will compel improvements in catalogues as well as in the goods they represent.

Inquiries of Master Mechanics.

The Secretary of the American Railway Master Mechanics Associaton, J. H. Setchel, Dunkirk, N. Y., has sent the following committee circular to the members:

PROPORTION OF LOCOMOTIVE CYLINDERS.

1. What rule do you recommend being used in calculating the proper size of cylinders of passenger locomotives, when boiler steam pressure, diameter of driving wheels, and weight on same, are given quantities?

2. State what, if any, deviation from this rule should be made in the case of freight and switching engines.

3. State your reasons for adopting such rules, and, if possible, demonstrate the correctness of the same by results obtained in every-day practice.

4. In making the calculations referred to, do you assume the diameter of driving wheels to be diameter outside the tires when new, or when half worn? What percentage of boiler pressure do you assume to be the average cylinder pressure?

5. Does your experience indicate that engines in which the ratio of weight on drivers to tractive power is much below the average, give better or worse results in work done, and in the economical performance of same, than engines of same tractive power, and in which the ratio between weight on drivers and tractive power is above the average? Is life of tires longer in one case than the other?

6. If you can present any facts bearing on this subject, and which may be of service to the Association, you are respectfully requested to communicate the same.

F. L. WANKLYN, G. T. R.,
T. E. BARNETT, C. P. R.,
CHARLES BLACKWELL, U. P. R.,
Committee.

Replies to be addressed to
CHARLES BLACKWELL,
Care U. P. R.,
Omaha, Neb.

There is a good deal of truth in the following, which we take from *The Engineer*. Stick-in-the-mud conservatism isn't, perhaps, a classical term, but under the circumstances it's rather expressive, you know:

"For real stick-in-the-mud conservatism one must look to a go-ahead country like the United States. There they fix the legs or arms of men and women and then slowly roast them to death. This is what they do every time their trains have a collision. If in England any such spectacle of weddedness to an old and vile custom could possibly be seen, Americans would in plenty say: 'Of course, you don't improve much!'"

The report of the proceedings of the 20th Annual Convention of the Master Car Builders Association has been issued from the office of the Secretary, M. N. Forney, 23 Murray street, New York. It is a volume of 280 pages, and has numerous illustrations to elucidate the topics discussed. Forty-two different car couplers are shown, and there are a great many more to hear from. Among the subjects reported on by committees and discussed at the Convention are standard dead blocks, end platforms for freight cars, slipping of wheels and standard height of draw bars for passenger cars. The rules governing the interchange of cars between different roads were discussed at length. The pamphlet includes standard dimensions and forms of construction adopted by the association.

Sir Henry Bessemer's latest proposition is to cast the armor plates for forts in position. He thinks plates 100 feet in length by 16 feet high could be cast in this way by making the usual brick and loam mould, and erecting the cupolas and Bessemer converters handy to fill the mould. The static pressure tending to burst the mould, he says, would not be large, as the metal would solidify, never leaving a large amount of liquid metal. A casting of this kind, weighing nearly a thousand tons, he believes could be cast in 16 hours.

Link Motion, as Designed by the Cooke Locomotive Works.

In ten-wheeled locomotives and consolidation engines it frequently happens that a front driving axle is located between the main axle and the link, and consequently the eccentric rods are often bent to clear the front axle, as shown in Fig. 1. Unless these eccentric rods are made sufficiently heavy, they will spring and interfere with the correct action of the link motion. Sometimes, too, there is not room enough underneath the boiler for these eccentric rods to work in, and therefore the boiler must be raised, which is a serious objection. Again, with rods of this kind, properly proportioned, the lifting shaft spring will have an extra amount of weight to counterbalance. Under the enterprising and energetic management of the Cooke Locomotive Works, Paterson, N. J., a link motion has been designed, of which a side elevation is shown in Fig. 2, and a plan of the link and the connecting bar *A* is represented in Fig. 3. As will be seen, in this design the eccentric rods are straight and shorter than they would be by extending the same over the front axle. The link block pin is not attached to the rocker arm as usual, but it is fastened to one end of the connecting bar *A*; the other end of this bar is connected to the lower rocker arm. The connection between the upper rocker arm and the valve is of the ordinary kind, and is not shown in these figures. The double hanger *B* vibrates on the pin *C*, which is fastened to the frame of the engine. To the lower end of this hanger the bar *A* is connected, allowing the latter to move freely in a longitudinal direction, but preventing it to move in a vertical direction when the link is to be raised or lowered. The link is suspended from the lifting shaft arm *D* in the usual manner, and the connection between the lifting shaft and the reverse lever is the same as that in any ordinary locomotive. A further description of the illustration is unnecessary, as all the remaining parts are clearly shown. In this design the connecting bar *A* can be and is made sufficiently strong to prevent any springing; and since this bar passes underneath the axle the boiler can be placed as low as the other parts of the locomotive will allow; also the lifting shaft spring will have less weight to counterbalance than otherwise it would have to do. This design has been successfully applied to a number of ten-wheeled engines built at the Cooke Locomotive Works, to whose management we are indebted for the courtesy in sending us the blue prints of this design.

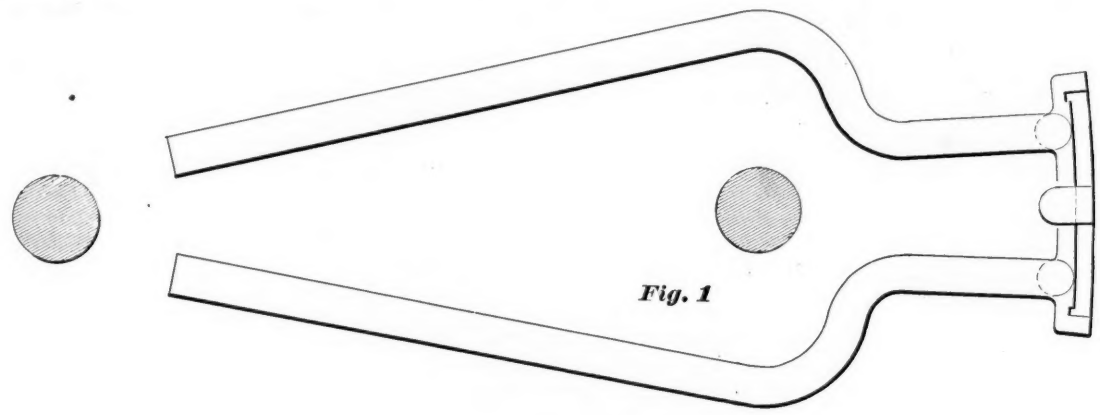


Fig. 1

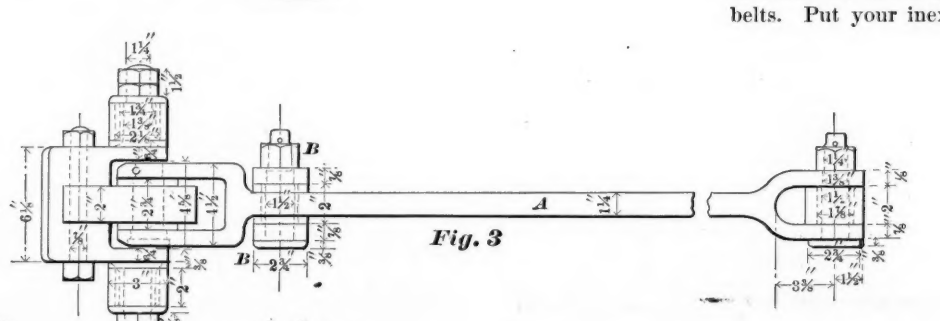


Fig. 3

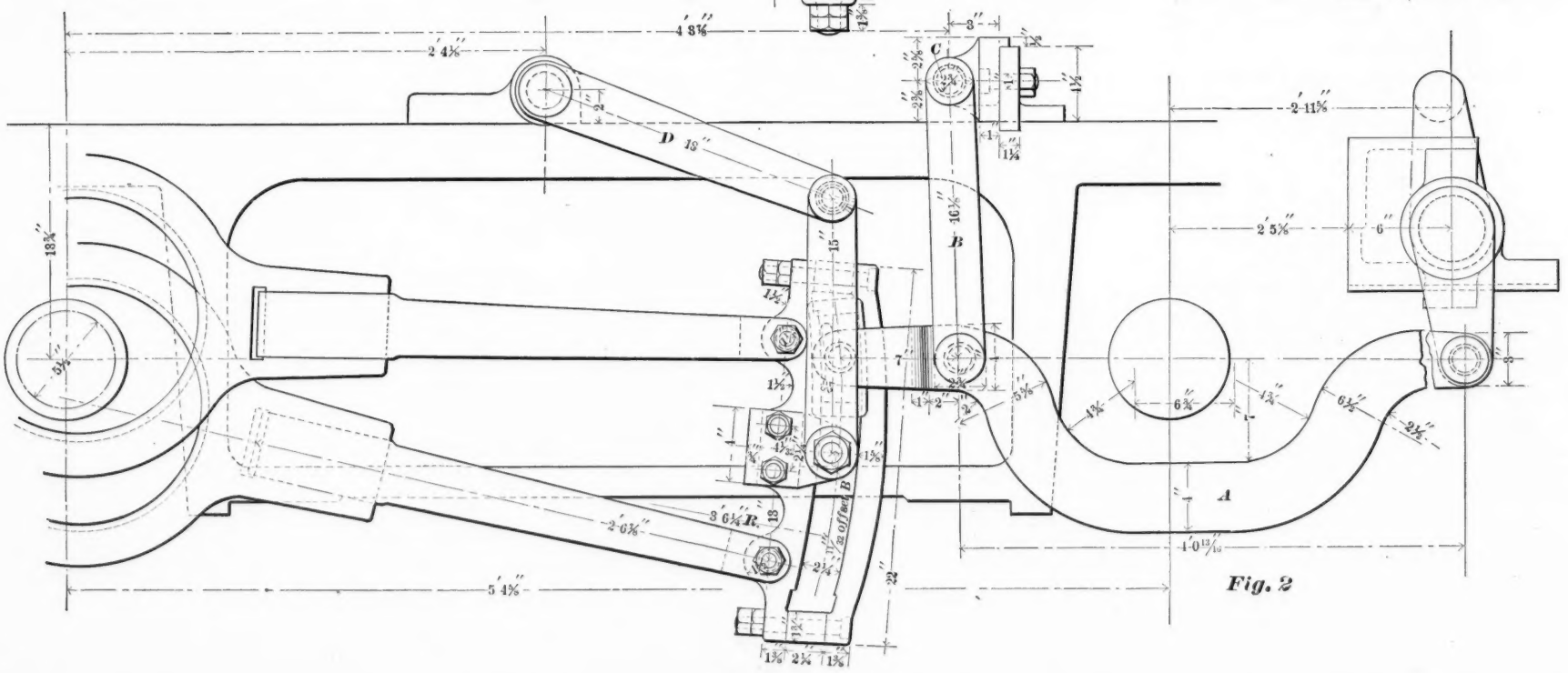


Fig. 2

Link Motion.

Iron vs. Steel for Locomotives.

Since publishing our sixty-eight letters from master mechanics of railroads, giving their preference for either iron or steel for piston-rods, crank-pins, slides and axles, we have received the two following:

SOUTHERN PACIFIC COMPANY.

Our experience with the use of steel for locomotive crank-pins, axles and piston-rods has been very satisfactory.

We think, for crank-pins, piston-rods and axles, that steel, such as we have been using for the purpose, namely, the Otis Iron and Steel Company's, of Cleveland, O., and the Pacific Rolling Mill Company's, of San Francisco, Cal., is much better than any iron we have ever used.

I think, for the purposes above mentioned, that steel, very low in carbon, is preferable.

We have never had a steel axle break, and we have never had a steel crank-pin or piston-rod break, except on account of its being too small to stand the work.

As for guide-bars, I do not think there is anything as good as wrought-iron, case-hardened.

A. J. Stevens,
General Master Mechanic.

BOSTON AND LOWELL RAILROAD.

I am using iron for crank-pins in most all cases, but I do still think steel is as good, and also find it should be as large where it is fitted into the hub of wheel as an iron pin, and also have a large rounding corner at the shoulder.

I think it will not spring or yield to a great strain, as will an iron pin, but it wears better on the collars and will not become eccentric as soon as soft iron by the continual pounding.

I think good forged iron as good for car axles, but for driving axles prefer steel.

For guides I prefer cast-iron to either wrought-iron or steel; for piston rods Taylor iron has given the best results. I find it about as difficult to get good iron that is adapted to all the places it is required as it is to get steel.

There is a great difference in the quality of steel that has been in use in past years.

J. H. Taylor,
Supt. Rolling Stock and Machinery.

Some of the more recent arrangements of kitchen boilers lead to the belief that the cook of the future must be a first-class engineer, and ought to be licensed. The innumerable pipes and cocks and other paraphernalia lead to the belief that even then a chart and compass might be required.

The Page Belting Company, of Concord, N. H., publish a pamphlet of considerable interest to users of belts. We make the following extract:

"In punching a belt for lacing it is desirable to use an oval punch, the longer diameter of the punch being parallel with the belt, so as to cut off as little of the leather as possible. There should be in each end of the belt two rows of holes, placed zigzag. In a three-inch belt there should be four holes in each end, two in each row. A six-inch belt should have seven holes, four of them in the row nearest the end. A ten-inch belt should have nine holes, in same form. The edge of no hole should come nearer to the side of the belt than three-fourths of an inch, and not nearer the end than seven-eighths of an inch. The second row should be at least $1\frac{3}{4}$ inches from the end. On wide belts these distances should be even a little greater.

"Begin to lace in the center of the belt, and take much care to keep the ends exactly in line, and to lace both sides with equal tightness. The lacing should not be crossed on the side of the belt that runs next to the pulley. One of the worst enemies the belt maker has to meet, is the improper lacing or otherwise fastening of belts. Put your inexperienced and unskillful man anywhere else, but never set him to putting on belts.

"If the belt should need oiling or greasing, avoid everything of a pasty nature. The belt should be made pliable, not covered with a sticky substance.

"In 'taking up' belts, observe the same rules as in putting on new ones. Never add to the work of a belt so much as to overload it."

We have been requested to give as much space as we can to the forthcoming railway jubilee at Paris in May, 1887. We would willingly give it all the space necessary, but find very little real information in the mass of printed matter sent us, which treats mostly of the immensity and importance of the exhibition.

Draftsmen Honor Their Retiring Foreman.

When George H. Smith, who had been foreman of the drafting department of the Brown & Sharpe Manufacturing Company for eight years, resigned his position to go into business for himself last November, his associates decided to present him a testimonial of their esteem. Choice was made of an album to contain a photograph of the drafting room, with all the men at their boards, autographs of all the men, and a specimen of the work of each. We have seen the album, and can assure our readers that it is one of the finest and most tasteful souvenirs of the kind that could be devised. The album is 6½x13 inches, and is bound beautifully in Turkey morocco, and inscribed in gilt letters, "From the Draftsmen: Brown & Sharpe M'f'g Co., Providence, R. I." The photograph, which is the frontispiece, is large and clear, so that the faces of all the men can be recognized. Then follows, beautifully engrossed on a scroll:

"To George H. Smith, Esq. Dear sir: It is with deep regret that we learn of your departure from among us, and we can not let the occasion pass without some expression of our high regard for you as an engineer, as a foreman and as a man, and our appreciation of those many good qualities which have rendered our relations so pleasant in the past.

That you may be as successful in your new as in your old field of labor, and that you and yours may prosper abundantly is the sincere desire of"

Here follow autographs of the twenty-one draftsmen, two or three of whom are contributors to the AMERICAN MACHINIST. Each of the other pages shows a specimen of the work of one of the men, and fine specimens they are. In accepting the gift Mr. Smith wrote as follows:

My Dear Fellow Workmen:

Your token of regard and esteem for me received, for which I thank you one and all most heartily.

While I might look back upon my administration among you and see mistakes without number on my part, I now feel that those errors have been looked upon by you at least as sincere, and with an honest purpose in view.

I rejoice at this spontaneous acknowledgment on your part of good feeling, appreciation and regard for my efforts and myself. I cannot express in words the value your present is to me.

I congratulate you on the unique design and method of conveying to me your good wishes, as by that I am enabled to look again into your faces, read your hearty sentiments, and look upon your individual work, which to me is far more valuable than any other expression of your esteem could have been, and I prize it highly.

Thanking you again, I remain, as ever, your friend and well-wisher."

Such friendly feeling between foreman and workmen cannot help but conduce to the successful operation of any establishment. All those who know Mr. Smith will agree that this elegant testimonial is well bestowed.

Moulding Pulleys.

BY ROBERT E. MASTERS.

The three cuts represent one of the most difficult jobs in moulding a web pulley that I have yet heard of, a description of which was furnished me by the young man who did the work.

The order called for a double flange web pulley, 16″ diameter, 10″ face outside the flanges, web to be 1″ thick. The firm had lately suffered from a fire wherein their pattern house and most of their patterns had been destroyed. The upper half of a web pulley pattern, 16″ diameter, 4″ face, ¼″ web, was all they had in the shape of a web pulley of the right diameter to make it from.

This was laid on four 1″ blocks *A A*, Fig. 1, and rammed up on the outside, flange segments bedded in and a parting made at *B B*, the inside of the pulley, and drag rammed up and turned over. The pattern was then drawn up ¾″ *C C*, Fig. 2, and the ¾″ space under the web filled in with sand through the four holes *D D* in the pattern. The pattern was then drawn up again ¼″ (which brought it flush with the first cheek) and the outside of the rim rammed up. This made the lower half of the pulley 5″ deep and the web ½″ thick. The pattern was then drawn out and the sand cut away from over the hub, and the hub drawn out as shown at *E*, Fig. 3.

A block the size of the outside diameter of the pulley, 1½″ thick with holes in it for the dowel pins was set on top of the lower half of the mould at *F*. This raised the rim up into the second cheek 1″. The outside of the pulley was rammed up, the top flange bedded in and a parting made. A cope with bars extending into *G G* was rammed up. The top cheek and the cope had strips laid across them outside and screwed fast to hold them firmly together. The first lift was made down to the parting *H*, the block *F* remaining on the lower half, the upper half laid back on the sand bed. The block *F* was taken out and the lower cheek lifted off, the flange segments drawn out, the lower half of the mould dressed up and the cheek put back on again.

The pattern in the upper half of the mould was drawn up, filled in, and the pattern drawn out as described in Fig. 2. The

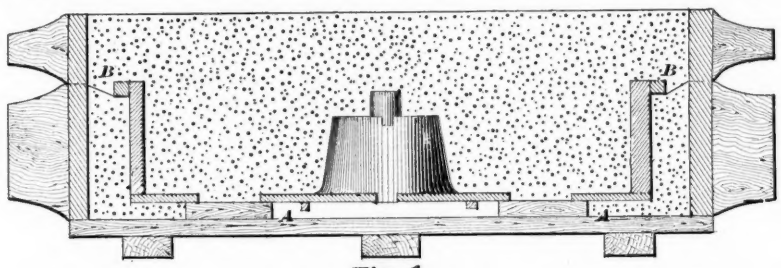


Fig. 1

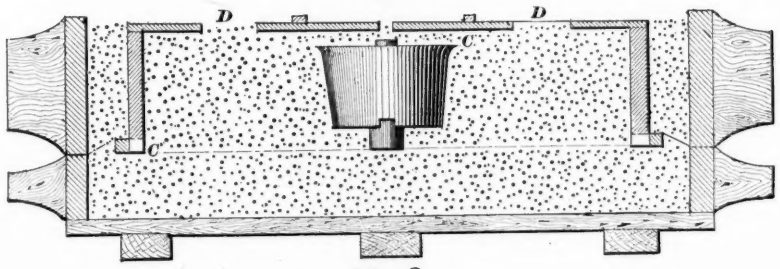


Fig. 2

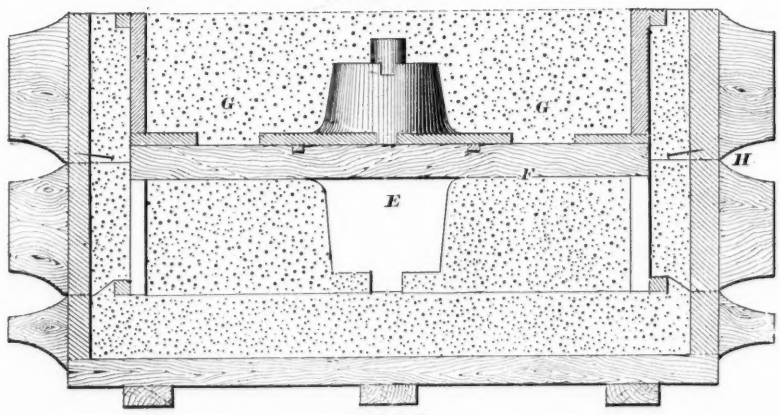


Fig. 3

MOULDING PULLEYS.

strips which fastened the upper cheek and cope together were taken off, the upper cheek lifted off the cope and set on the lower half of the mould, the upper flange segments drawn out, the upper half of the core dressed up and the mould closed.

The moulding of this pulley shows a great deal of ingenuity in filling an order, and contains many valuable ideas that can be employed on other "makeshift jobs." Had the hub been screwed fast to the web pattern it would have saved a little time; or had a 16″ band pattern been at hand, and the inside of the pulley made with dry sand cores, as described in AMERICAN MACHINIST, March 5th, 1887, it could have been made with less expense. But I would not advise the making of solid cores for small pulleys that are to have arms in them, especially straight arm light pulleys; they are apt to crack in the rim or arm in shrinking on a solid core center. A moulder who understands his business will, with a band pattern, loose set of arms and good lifting plate, make an ordinary sized pulley in about the same time that it will take a man to make the core irons and set of cores for the arms, and such a moulder will not find occasion to do much slicking or mending or take a nap under the upper half of the pulley.

After casting any pulley, it is a good plan to punch the center core out as soon as practicable, being careful not to "bleed the hub." When the hub is out of proportion to the arms and rim in small pulleys, it is advisable to act on the suggestion of Mr. David Spence in this journal, Feb. 26th, 1887. "Turn the flask up on the side, take off the bottom board (if one is used) dig out the center core, clean the sand away from around the hub, and allow it to cool before taking the pulley out of the flask."

It is just as necessary to bare the hubs of large or medium size pulleys where they are out of proportion to the rim, and sometimes to cool the hub off with water. For instance, last week we made a straight arm pulley of medium size, in which the hub was of a necessity out of all proportion to the rim, and would have remained hot for hours after the iron in the rim had set. The following dimensions will give the reader a better idea of it: Pulley, 60″ diameter, 20″ face; rim, ½″ thick at edges, tapering inside to 1¼″ in center of rim. The pulley was to go on a 10″ shaft; the hub was 20″ diameter, 10″ deep, with a straight 9″ core in it. When the pulley was cast, and the center core dug out, a light stream of water was kept on the top and inside of the hub, until it was quite black.

Sometimes the center cores are hard, and have rods in to stiffen them while drying. This makes it no easy matter to punch them out, especially when the hole in the hub is not large, and a moulder who has to stand over a hot mould on a 90-degree-in-the-shade day in August, and punch away at a core that is as hard as flint, is liable to say most anything but his prayers. A little flour in the core sand, and light pine sticks instead of core irons in this class of cores, will help the matter wonderfully.

These ideas of cooling down hubs are not new, by any means, but will, no doubt, be valuable to many of our foundry friends.

Interesting railway relics have just found their way to the Birmingham Reference Library, in the shape of a volume of early prospectuses of local railways. Some of the provisions in the prospectuses sound somewhat strange now. The Birmingham and Liverpool Railroad Company, 1824, promises "to transport heavy goods at the rate of at least eight miles an hour," and states that "passengers may also travel with perfect security at the rate of at least twelve miles an hour, but to this the company will not pledge themselves." The same company in 1830 informs the public that "engines with passengers have frequently been known to exceed the velocity of thirty miles per hour, but a rate of from ten to twenty miles per hour has been established as safe in operation and certain of attainment. This extraordinary rapidity is accompanied with a motion so gentle and easy as to excite no alarm even in the most timid." The "London and Birmingham Railway Company's plan," issued in 1832, shows that the journey from Birmingham to Coventry may be accomplished in one hour, and that from Birmingham to London in five hours and a half; and their prospectus issued in 1833 states that their ordinary rate of traveling was from fifteen to twenty miles per hour.—*The Engineer.*

LETTERS FROM PRACTICAL MEN.

Unhandy Locomotives.

Editor American Machinist:

Many of our modern locomotives show the want of road experience in the unhandy cab fittings, and many are the cursings their makers get for the uncomfortable contrivances found on their boiler heads. Many builders place the engineer's brake valve, or three-way cock, of the Westinghouse brake in all sorts of out of the way places; on some consolidation engines, recently built for the Denver and South Park road, it was close to front of cab on top of boiler and behind the steam gauge. In order to handle it the runner was obliged to stand up and in front, reach over throttle, injector, etc., and could not see out of cab window at all, and on a road where there are heavy grades for 75 and 100 miles at a stretch, this could not be endured. Other makers place the cock on the back of boiler head and high up on consolidators, and the bold engineer has to cramp his shoulder blade and bend his elbow the wrong way to reach it from his seat. Some of our mountain roads are placing it on side of window opposite the cab window and seat. This is an improvement, but has the grave disadvantage that it gets very hot and sticks. The oil in it gets gummed and the air pipes pass over the boiler head, making it hard to clean. There has never yet been found, on this class of engine in particular, a better place for it than on the side of cab in front of engineer. It is the natural position for the left hand of the runner, whether sitting or standing—in front and down; it keeps cool; the pipes are under foot board and out of the way and out of sight; it takes less pipe and less fitting to put it there; and why it has gone to the top of the boiler is a mystery to your subscriber, who has just got a cramp in his neck from a trip on a kettle that carries her brake valve two feet back of the seat and as far in as one can reach and see ahead.

Another bad scheme is the finishing of brass packing nuts on cab fitting in all sorts of odd shapes. The hex. or octagon nuts on injectors, etc., are often finished by cutting a square crease in the corner, making a specimen of how many corners the man at the Fox lathe can get into the work. Every time a wrench touches one of the nuts there are two or three bruised corners; the sharp crease cannot be cleaned easily, and in short order there is a dirty bruised piece of work. Now when this nut is finished with the corner rounded off nicely it is not bruised by ordinary wrenches. Every spot is reached by a piece of waste, given a circular motion by the industrious fireman, it is sightlier, stronger, easier made, and thus cheaper.

Twisting and turning steam pipes over a boiler head, so that waste has to be drawn between the hot pieces with a pair of blacksmith tongs, is a nuisance only equaled by

the reverse lever with a churning attachment, or the fire door with no provision to keep it open. These are only little things, but they are solid comforts or everlasting nuisances to engineers and fireman, and often make a class of engines unpopular on a road where they are really the best otherwise.

Why the overflow nipple of an injector should be small and empty into a funnel-shaped top of the waste pipe is another mystery. Every time the injector is started there is a cloud of steam in the cab, a little baptism with warm water, clouded windows, rusted jacket and profanity. I have been running a No. 7 Monitor injector for two years with a union next to it and a solid steam pipe connection on overflow. It primes quickly, and does not give a free bath with every start. I could go on for some time, but I hear the rich brogue of the caller.

John A. Hill.

So. Pueblo, Col.

The Unexpected.

Editor American Machinist:

Some four years since, a globe-shaped float for a ball-cock got badly flattened, and I slowly revolved it by its lever over the forge fire. All of a sudden, with a sort of a crackling noise, it rounded out into perfect form. Not long after a similar float got frozen in a tank of water, and was badly jammed by the ice, and one of my men who had seen me bring the other back to a thing of beauty, essayed the same thing, but, unfortunately, the conditions were not the same. There was either some water in his, or else he held it there too long, for there was a violent explosion; the forge was blown down, the shop set on fire, and poor Tom lost the sight of one of his eyes.

As the "unexpected" quite often happens, it is fully as safe to remain at a respectful distance while unknown forces are being fooled with.

P. H. B.

The Value of Coals.

Editor American Machinist:

In No. 98 of your "Questions and Answers" you state, as your experience, "that if the boilers were crowded with large coal it would not be possible to make steam with pea coal without using a blower; also that pea coal would give about three-quarters the effect, ton for ton, that large coal would give."

It is a truism, perhaps, to say that there is pea coal and pea coal; also that there are boilers and boilers; but from these truisms may be evolved the principle, familiar to many steam-users, that some grades of pea coal are nearly as economical and quite as effective as the best grades of large coal. If you can spare the space in your valuable journal, an illustration of this principle will be given.

Some tests with a cylindrical tubular boiler recently made by the writer, show an extraordinary difference in the economical and effective values of well-known varieties of pea coal. The boiler used in these experiments was connected with a high chimney, and the flues, draft area over bridge wall, etc., were proportioned for maximum combustion with natural draft. The principal dimensions of this boiler are given in the appended table. An experiment was also made with a second cylindrical tubular boiler, the draft being forced by a blower. A different variety of coal was burned in each test.

All of the tests were conducted in the same manner: starting with a fresh fire, and charging as ashes the contents of the furnace at the completion of the trial; making careful tests of the quality of the steam, and correcting the apparent evaporation in accordance with the results so obtained; and burning as much coal as possible under the given conditions. The principal data of the trials are given in above two tables.

As the pressure of steam and temperature of feed-water varied in the several tests, the evaporative results have been reduced to the common standard of equivalent evaporation from and at 212° Fahrenheit.

By comparing corresponding quantities in lines 6 and 9 of the foregoing table, it will be seen that the maximum hourly combustion and evaporation were obtained with the pea coal "C," the combustion and evaporation being both greater than were obtained with the large coal, which was a coal having the highest reputation and commanding the highest price in the market.

Richard H. Buel.

[Mr. Buel's experiments are beyond question instructive and valuable. They do not, however, lead to the belief that any modification of the answer to the question referred to is, for general purposes, required. Ordinarily speaking, for the use in steam plants of manufactories, I do not believe that pea coal is worth more than 75 per cent. as much as the larger sizes. There may be special cases where this is not true.

Mr. Buel's statement that there is pea coal and pea coal ought to be supplemented with the counter statement that there is lump coal and lump coal. A test of four kinds of pea coal against one kind of lump, selecting the best result from the pea coal for comparison, is unfair, notwithstanding the fact of the large coal "having the highest reputation and commanding the highest price in the market."

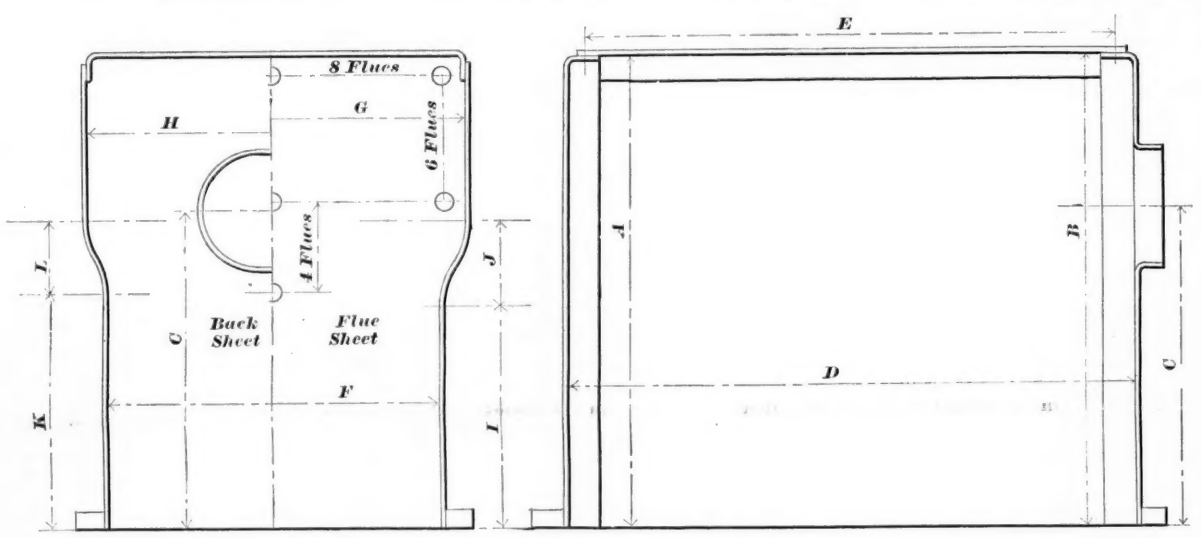
The question was answered from actual observation, and from six tests of coal made with the same boiler, and with all conditions, as far as they could be governed, identical, except that a new grate was put in for the pea coal. These tests were with three kinds of pea coal and three kinds of large coal, all bought in a market where coal was readily had. The average results showed that the pea coal was 81 per cent. as effective as the larger coal; but as the grate for the pea coal was new, and presumably in the best condition, and as, when the grate becomes warped by use the waste of pea coal is materially greater than the corresponding waste of large coal, I believed then, as I do now, that, taking coal as the steam user can buy it in the market, pea coal is worth 75 per cent. as much as the larger sizes F. F. H.]

DIMENSIONS OF BOILERS.

Number for Reference.	Item.	No. 1. With Generator.	No. 2. Ordinary Setting.
1	Diameter of shell, in.	66	66
2	Length of boiler, ft.	16	15
3	Number of tubes	60	70
4	Outside diameter of tubes, in.	4	3.25
5	Heating surface, sq. ft. Boiler	1181.9	1063.63
6	Heating surface, sq. ft. Generator	248.7	
7	Heating surface, sq. ft. Total	1430.6	1063.63
8	Grate-surface, sq. ft.	33	33
9	Ratio of heating-surface to grate-surface.	43.35	32.23

TESTS OF CYLINDRICAL TUBULAR BOILERS WITH DIFFERENT COALS.

Number for Reference.	Item.	Boiler No. 1, Natural Draft.				Boiler No. 2, Forced Draft.
		Best Quality Large Coal.	Pea Coal. A	Pea Coal. B	Pea Coal. C	Pea Coal. D
1	Duration of test, hours	11.8	11 6	10.8	11.75	8
2	Pounds of coal burned	6373	5871	6905	7715	4541
3	Pounds of refuse	1027	1217	1092	1043	804
4	Per cent. of refuse	16.11	20.73	15.81	13.52	17.73
5	Pounds of water actually evaporated from and at 212° Fah.	74219	63437	58529	88453	40439
6	Hourly quantities, pounds. Coal. Total	540	506	639	657	568
7	Hourly quantities, pounds. Coal. Per sq. ft grate surface	16.4	15.3	19.4	19.9	17.2
8	Hourly quantities, pounds. Coal. Per sq ft. heating surface	0.378	0.354	0.447	0.459	0.534
9	Hourly quantities, pounds. Actual evaporation from and at 212° Fah. Total	6290	5469	5419	7511	5055
10	Hourly quantities, pounds. Actual evaporation from and at 212° Fah. Per sq. ft. grate surface	190.60	165.72	164 22	228.12	153.2
11	Hourly quantities, pounds. Actual evaporation from and at 212° Fah. Per sq. ft. heating surface	4.40	3.82	3.79	5.26	4.75
12	Pounds of water actually evaporated from and at 212° Fah. per pound of coal	11.65	10.81	8.48	11.47	8.91



Locomotive Boiler Dimensions.

"CLASS A" ENGINE. MEASUREMENTS IN INCHES.

Engine.	No.	A	B	C	D	E	F	G	H	I	J	K	L	Flues.	Fire door pattern.
"	1	60	58	40	70	65⅛	41	48	46	28	8	24	9	160 2¼	6
"	2	64	62	44	72	67⅛	41	50	50	30	9	26	8	170 2	9
"	3	56	56	36	60	55⅛	36	44	40	"	"	"	"	140 2	7
"	4	"	"	"	"	"	"	"	"	"	"	"	"	150 2¼	4
"	5	"	"	"	"	"	"	"	"	"	"	"	"	190 2	3

System of Keeping the Dimensions of Different Parts of a Locomotive.

Editor American Machinist:

The accompanying drawing is lettered in a manner which will enable any one to keep a record of the dimensions of fire boxes of different sizes for boilers of the same class. Indeed, this system of keeping or giving the dimensions is applicable to many other parts of the engine, and is often used in locomotive works. I have used this system with advantage in boiler shops, and with it was enabled to fit up, rivet and caulk fire boxes, and have them ready to be put in the boilers before the worn-out fire boxes were cut out.

Cards lettered and printed similar to the drawing are very useful and convenient on railroads having engines in which the dimensions of similar parts of the same class of locomotives vary, caused by having the engines built in different locomotive shops according to the standard design of these works. Now, when one of these engines gives signs of needing a new fire box the foreman or some other competent person can measure the fire box and fill out the card, from which the material can be ordered and the box built before the engine is brought in the shop for repairs. In the meantime if a small job should be brought into the shop, the foreman—in many cases—may have time enough to stop work on the fire box, and put his men on the required job; and when this is finished the fire box can be completed before it is actually needed and thus prevent the engines from being kept in the shop longer than many railroads can afford to do.

By filling out the table which is printed on or attached to the drawing, the dimensions of many different sizes of fire box can be kept, or ordered to be built, without making a separate drawing for each.

Buffalo, N. Y. James Heron.

Flow of Water Through Long Pipes.

Editor American Machinist:

In your issue of Feb. 26, 1887, Mr. Wm. H. Harrison has an article on "Difficulties in Pumping Water," in which he says that a 2″ pipe 800 feet long and 16 feet lift will, at a velocity of the water of 10 feet a second, deliver 36 gallons of water a minute, and a 4″ pipe will, under the same conditions, deliver only 51 gallons a minute.

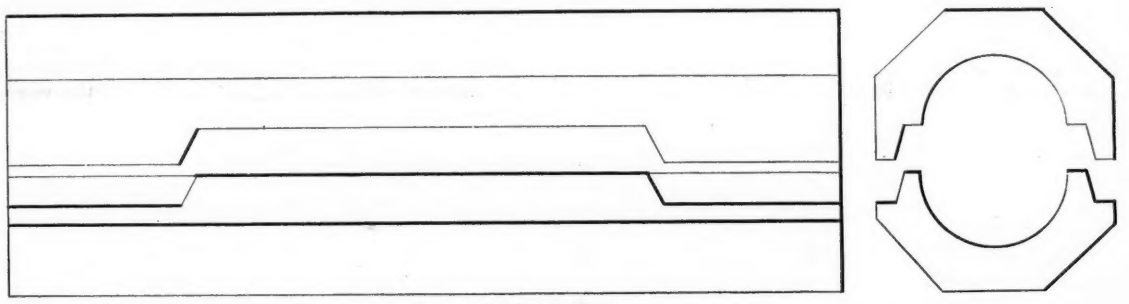
Having studied his figures, I arrived at a much different result. Taking the internal circumference of the 4 inch pipe at 1 foot, we will have 800 feet of wetted surface; then, as the frictional resistance at a velocity of 10 feet per second is equal to .45 pound for each square foot of wetted surface we will have: $800 \times .45 = 360$ lbs., which would be the pressure required to keep the water in motion at that velocity. The area of a 4″ pipe is equal to its circumference, 12.57. Then $12.57 \times 7.76 = 97.54$; consequently the proportion would stand $360 : 97.54 :: 10^2 : 27$. $\sqrt{27} = 5.2$ very nearly. There are 12″ in a foot and 60 seconds in a minute. Then, $5.2 \times 12 \times 60 \times 12.57 = 47{,}062$ cubic in.; dividing this by 231 we will have 203.7 gallons discharged by a 4″ pipe of 800 feet long and 16 feet lift in 1 minute. As, according to my figures, the discharge of said 4″ pipe would be about 4 times as much as what Mr. Harrison makes it, I would very much like to know where I make the mistake.

Louis Kunz.

Cores and Core Boxes.

Editor American Machinist:

Among the numerous ways of mixing and using core sand to prevent blowing, I have tried many. Some time since I had a large number of tubes to make 3 feet in length, and cored the full length. This core was 1 inch diameter through the body, and the prints were ½ inch, which left but a small space in which to form vents. As these tubes must be perfectly clean and the core hole perfectly straight, it was necessary to cast them on end, so that the vent must all come from one end. We were bothered very much with their blowing, until one day I took enough hot water to wet the batch of core sand and added a quantity of hot glue from the patternmaker's glue pot, stirring until thoroughly mixed, and wetting the sand with this, using no other ingredients. We had no more trouble. The glue makes a very strong core, and as there is but a very little gas from it, the chances for blowing are very small. The core box should be oiled for each core to prevent the glue from sticking.



CORE BOX.

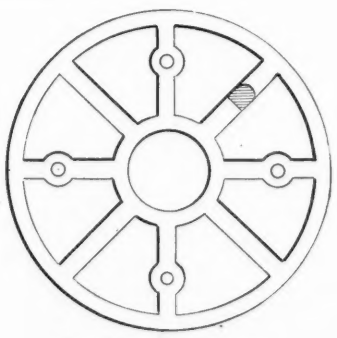
Enclosed is a sketch of a core box which I think is the best I ever saw. It requires no dowel pins or machine work of any kind; a few rubs of the file, and it is ready for use. The one shown is for a ¾-inch core; of course it can be made of any length or diameter. It has many advantages over the wooden box, which will be readily seen by foundrymen. W. P. BRYAN.

Lifting Plates for Pulleys.

Editor American Machinist:

I am very much pleased with your letters from practical men and have learned considerable from the same, and have no doubt all your readers have same feeling. In Robt. E. Master's letters on pulley moulding he speaks of lifting plates as being fitted between arms of pulleys to lift the sand from inside the rim. Now these plates so made are a costly kind for jobbing shops to use, as they require a pattern, and cost considerable for moulding, and if only needing one of a size, the pattern will cost more than the plate.

We use instead of these plates, gratings cast open in the sand and made with a gate cutter without pattern, and which do not require bedding between arms with risk of not being down solid, and, consequently, letting molten iron underneath, destroying the mould.



GRATING FOR PULLEYS.

This is a rough sketch of grating with inside and outside circles to suit size of rim and hub, and connected by arms. The four holes for lifting bolts are either tapped in arms or may be wrought nuts cast in about equal distances apart, so as to balance when lifted out.

This grating is used as follows: Make your parting in center of arms, use your parting sand, then sieve on moulding sand to cover arms, level this sand, clay wash grating and place in position, then cover with sand, filling pulley rim and ramming, same as with other lifting plates. These gratings have an advantage over plates, also, that they may be used for straight arms, curved arms or web pulleys.

While speaking of pulleys, will Mr. Masters or some one else tell me the cheapest way to make iron pulley flasks for use on machine, so as to mould narrow and wide pulleys with least outlay for flasks.

Crookston, Minn. I. E. M.

Cutting Tools.

BY FRED. J. MILLER.

FIRST PAPER.

Probably a majority of lathesmen have a very firm belief in that old tradition of the machine shop, viz., that to get any good results from lathe tools they must always be set "above the center," and we often see a man carefully set all turning tools so, and then, as if to prove himself consistent, set boring tools the same way, unmindful of the fact that by so doing he secures, in the case of boring tools as usually formed and ground, much the same cutting action as would be secured by setting a turning tool below the center.

This same man will probably take considerable time and pains to grind threading tools exactly to standard gauge, and then "give them plenty of clearance, and set them high," so as to make them cut a smooth thread, never stopping to think that by so doing all his pains-taking at the grindstone or emery wheel goes for naught, and that, however nicely his gauge may fit the tool, it will not fit a thread cut by such a tool, as a moment's consideration, or a simple trial, will easily show.

The fact seems to be that it is far better for the mechanic to divest his mind of all such arbitrary rules, as far as possible, and use his best judgment in each case without much regard to rule or precedent.

So far as the cutting action of any turning tool is concerned, it is safe to say that if it is rigidly supported in all cases, its efficiency will be entirely independent of its position with regard to the center upon which the work turns, but that everything depends upon the various angles of the tool, and the angle at which it is set with a line drawn from the center to the point of the tool, wherever that may be.

Figs. 1, 2 and 3 will serve to illustrate the principle. In Fig. 1 we see a tool formed and set in the usual manner; one which most of us will consider to be quite orthodox. In Fig. 2 we will suppose the same tool to have been bent back until when it is set just level with the center, the same cutting angle is secured, as in the case of Fig. 1, and in Fig. 3 we have the same tool again, but bent back still more, so that to secure the same cutting angle again it must be set below the center.

Now this latter position will seem execrable to many, and of course on some accounts it would be objectionable; but I don't believe it is as bad as it looks, and the point I wish to make is that so far as its mere cutting action is concerned, this tool will be equally effective and satisfactory in any of the three shapes and positions shown, provided, of course, that it is supported with equal firmness in each case.

Now, of course we all know the objections which could be brought against No. 3, but the only point which I can think of in which it would be in any way inferior to No. 1, is the fact that it would have more or less tendency to pull into the work; but so far as its cutting action is concerned, it must be the equal of either of the others, because all angles which influence the cutting action are identically the same in each case.

The shears of most lathes are worn down much the fastest nearest the head, and when turning work a little longer than usual in a lathe worn in this way, the carriage, as it approaches the head, is let down the amount of the wear, and if we are using a tool like Fig. 1 the work is turned smaller. If using a tool as in Fig. 3, under the same circumstances, the work from the same cause will be turned larger instead of smaller, which, of the two evils, would generally be prefered. But with a tool such as Fig. 2 this wear of the shears will have the least possible effect upon the work, and so in this respect, at least, it would seem to be the best of the three.

Then if it is to be used in a compound rest or with a taper attachment, it is undoubtedly best because it will cut best when level with the center, where, for reason, pretty well understood by most lathesmen, a tool must be set to do taper or angular work correctly.

Within the last few years tools have been introduced especially for cutting accurate screw threads; not accurate as to pitch, but merely as regards the shape of the thread, and any one who has tried by means of an indifferent grindstone, and a U. S. standard thread gauge, to produce an accurate thread of that form, will agree with me, that such tools have a value far above their cost. Now, these tools afford a good example of the advantage to the lathesman of thinking about what he is doing, and of the best method for accomplishing a given result, rather than blindly adhering to certain rules or traditions.

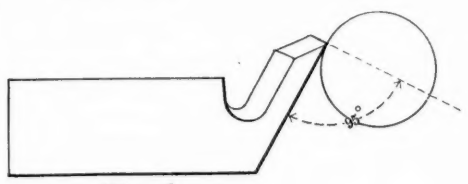


Fig. 1

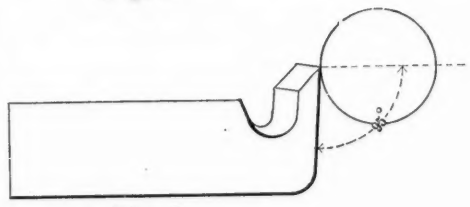


Fig. 2

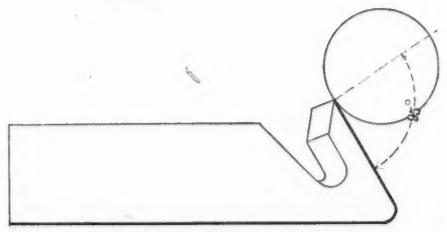


Fig. 3

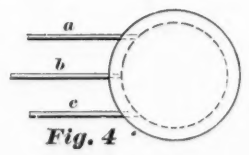


Fig. 4

CUTTING TOOLS.

Strange as it will appear to many, it can be demonstrated that in order to produce screw threads of accurately correct shape with these tools, they must be set sometimes above, sometimes level with, and at other times below the center, according to the construction of the lathe in which they are used.

To begin with, it may be stated as a fact that where accuracy of form of thread is sought there is nothing to be gained by grinding thread tools so as to have top rake, or in any other way than that known as level. This is so, because in grinding a thread tool the gauge must be applied along the cutting edges of the tool; and then in setting it in the lathe, its top face must always lie in a line radiating from the center of the work, and to secure this condition it must be set either above or below the center, according as the tool is ground with its top face having a forward or backward inclination. This is made clear by simply placing the point of a thread gauge between the threads of a properly cut screw, when it will be seen that the gauge fits the screw only when it lies in a radial line, as in position *b*, Fig. 4, and that it will not fit at all in either position *a* or *c*.

The fact that the cutting edges or top face of the tool must lie in a radial line being thus proven, we may next consider what effect the peculiar construction of the lathe in use may have upon the method of setting the tool, and its vertical height relative to the center, when properly set.

The *Industries*, referring to an American manufacturer who divides some of the profits with the men in his employ, remarks: "It is to be feared that in this country (England) profits are, as a rule, cut down too low to permit of such an excellent scheme being carried out into practical working."

The *American Miller* says: "Notwithstanding the epidemic of legislation to protect the poor granger from the red-handed grist miller, we notice no law that is quite so beautifully inconsistent as the Illinois law on the subject of toll. In this State the law permits the miller to take an eighth for grinding and bolting and a seventh for the single service of grinding. By what process of reasoning did the originator of the toll law arrive at such a decision as to what was due the miller? Manifestly because he thought an eighth part was greater than a seventh part. We can believe that of some State legislators."

Literary Notes.

The textile portion of the *Journal of Fabrics and Dry Goods Bulletin* is up to the mark, but the political portion is inferior to the average village newspaper. The editor should either study more textile developments and less politics, or less textiles and more politics, in order to get an equilibrium.

L'Industria, Revista Technica ed Economica Illustrata is a new mechanical newspaper which started at Milan, Italy, the first of the present year. It is published weekly, and seems to be well supported by advertising. As this is the first Italian technical journal we have seen, our editorial department has no adjunct conducted in that language, and we cannot, therefore, pass a critical opinion upon its contents. There must be room in Italy for a mechanical newspaper. We receive more subscribers from Italy than any other country where English is not the prevailing language, except Germany, and our mailing list covers every civilized country in the world. Any one who supposes that the spirit of mechanical progress is not active in Italy is greatly mistaken.

The futility of discussion without substantial grounds was never better illustrated than in that going on in English journals with reference to English and American locomotives. The discussion on both sides is, so far as we can see, unprofitable, in that no one learns anything from it.

English journals are in the way of trying to score a point on the car heating question in this country. Most people will see but little difference between the possibility of incineration here and the certainty of close approximation to freezing there. Either is outrageously bad.

AMERICAN MACHINIST

PUBLISHED WEEKLY

BY

American Machinist Publishing Co.

HORACE B. MILLER, Pres't.
JACKSON BAILEY, Vice-Pres't.
LYCURGUS B. MOORE, Treas. and Sec'y.
96 Fulton Street, New York.

JACKSON BAILEY, Editor. HORACE B. MILLER, Business Manager.

F. F. HEMENWAY, Mechanical Engineer.

The American News Company,

Publishers' Agents, New York.

The International News Company,

11 BOUVERIE STREET, Fleet Street, LONDON, ENG., will receive subscriptions for the AMERICAN MACHINIST, at 14/7 per annum, postage paid.

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NEW YORK, MARCH 26, 1887.

CONTENTS.

PAGE

Moulding a Web Pulley. By Geo. O. Vair 1
Thirty Inch by Thirty Inch by Ten Foot Planer. 1
Machinery *vs.* Firemen 1
Practical Drawing. By J. G. A. Meyer. Twentieth Paper 2
Mechanics of Making a Daily Paper 2, 3
A Copper-tipped Hammer 3
Eight-Roll Planing Machine 3
Inquiries of Master Mechanics 3
Link Motion as Designed by the Cook Locomotive Works 4
Iron *vs.* Steel for Locomotives 4
Draftsmen Honor their Retiring Foreman 5
Moulding Pulleys. By Robert E. Masters 5
Letters from Practical Men—Unhandy Locomotives. By John A. Hill—The Unexpected. By P. H. A.—The Value of Coals. By Richard H. Buel—System of Keeping the Dimensions of Different Parts of a Locomotive. By James Heron—Flow of Water Through Long Pipes. By Louis Kunz—Cores and Core Boxes. By W. P. Bryan—Lifting Plates for Pulleys. By I. E. M 5, 6, 7
Cutting Tools. By Fred. J. Miller. First Paper. 7
Literary Notes 7
How the Law in Relation to Steamboat Inspection was Changed 8
Barring Out the Bars 8
Questions and Answers 8
Manufactures 9
Machinists' Supplies and Iron 10

How the Law in Relation to Steamboat Inspection was Changed.

The following was the United States law in regard to thickness of plates of externally fired boilers, prior to Feb. 11, 1885: "No boiler to which heat is applied to the outside of the shell thereof shall be constructed of iron or steel plates of more than twenty-six one-hundredths of an inch in thickness, the ends or the heads of the boilers only excepted." Upon the date mentioned above, the following amendment was approved: "Provided that boilers to which heat is applied on the outside of the shell thereof may, in the discretion of the Secretary of the Treasury, be authorized and used on steam vessels navigating the Atlantic or Pacific ocean, or salt water bay or sounds, or the great lakes, or any of them, and water flowing to or from the same or any of them, when constructed of iron or steel plates not exceeding fifty one-hundredths of an inch in thickness."

This amendment was, as is generally understood, made in the interest and for the immediate benefit of a shipbuilder who persisted in constructing boilers without much reference to inspection laws.

Locomotive builders in this country, without any restriction of law, almost or quite universally confine themselves to $\frac{5}{16}$-inch and $\frac{3}{8}$-inch plates for inside fire-box (with the exception, of course, of tube sheet), and some of them have come to these thicknesses through very unsatisfactory experience with heavier plates. It is altogether probable that but for the accommodation of a single individual, the United States inspection law would never have been modified to cover sheets of externally fired boilers of more than $\frac{3}{8}$ inch in thickness. It was a matter of politics rather than judgment.

Barring out the Bars.

Those railroad companies that refuse to employ anybody that drinks liquor, and at the same time rent out a part of their property at stations along the line for the purpose of keeping rum shops, are no more consistent than the man who shouts for total abstinence, and takes whiskey straight behind the door. Some companies take hold of the liquor problem at the right end and try to remove the inducements to drink as much as possible from their employes. President Harris, of the Northern Pacific, has just issued orders that no property of the company shall be let for the purpose of selling liquor. It will, therefore, be consistent on that road to refuse to employ men who drink too much, or, indeed, who drink ardent spirits at all. The temperance principle can be advanced more by railroad companies and other large employers than by statute laws.

Some one ought to devise means for improving ventilation in machine shops. It is a fact that the average in this respect is phenomenally low. It is a matter of as much importance to owners as to workmen. In a machine shop, especially where a good deal of cast-iron is worked, there is a necessity for very frequent change of air, while the average arrangement is for no change at all, except by accident. No man can do a good day's work in impure atmosphere, laden with solid matter which he is obliged to breathe, if he breathes at all. A good way to increase the output of many shops, as well as to improve the quality, is to improve the ventilation.

There is a bill before the Legislature of New Jersey to inspect and license boilers and engineers. It provides for an Inspector-in-Chief and two deputies, and divides the State into two districts. Every boiler owner must report to the deputy in charge of his district. All boilers under five horse-power must be inspected and licensed at a cost of $5 each to the owner. Engineers are to be examined and licensed by the inspectors or by practical engineers appointed by them. Each license costs $3. Boilers insured by a steam boiler insurance company doing business under the laws of the State are to be exempt from the provisions of the act. Every steam boiler must have three gauge cocks, one water column and gauge glass, one safety valve and one check valve between feed water and boiler, and each boiler must be supplied with either a feed pump or an injector.

The bill, we understand, meets the approval of the engineers' associations through the State.

So far as we hear, wherever there are evening schools for mechanics in operation this winter they are working successfully, but they are nowhere so successful as they might be made if employers manifested more interest in them. Where such schools are in operation the class of bright, intelligent young mechanics, just the class that manufacturers want, are attracted, and getting interested in educational matters, will stay there. This, our observation is, is the case wherever such schools are well sustained.

If some of the cities and larger towns which put forth costly efforts to induce the location of manufactories would do more in the direction of establishing and sustaining evening mechanical schools, they would, at very small expense, offer an additional inducement that is becoming more and more effective every day.

The Secretary of the American Society of Mechanical Engineers, F. R. Hutton, 280 Broadway, New York, has sent a preliminary circular announcing that the spring meeting of that society will be held in Washington, D. C., about the middle of May next. Papers for the meeting must be in the hands of the secretary before March 25. Fewer papers than usual have thus far been presented or promised. Topics for topical discussions are also called for.

Our foundry contributor, Thomas D. West, has gone into the business of making iron castings on his own account in Cleveland, Ohio. His ability in that line has been well demonstrated. His articles in the AMERICAN MACHINIST, and his two books, "American Foundry Practice" and "The Moulder's Text Book," have attracted favorable attention everywhere. We wish success to the Thomas D. West Foundry Company.

We receive very many inquiries from persons who want to know the particular issues in which J. G. A. Meyer's articles on Practical Drawing and Modern Locomotive Construction have appeared up to the present time.

For the convenience of these inquirers, we will say that the following issues contain Mr. Meyer's articles on Practical Drawing:

October 23 and 30; November 6, 13, 20, and 27; December 4, 11, 18, and 25, 1886; and January 1, 8, 15, 22, and 29; February 5 and 19; March 5 and 12, 1887.

The articles on Modern Locomotive Construction are to be found in issues of the following dates:

June 27; July 4, 18, and 25; August 8, 15, and 22; September 5, 12, and 26; October 10 and 24; November 7 and 21; December 12 and 26, 1885; January 2; February 13; April 17 and 24; June 5 and 12; August 7, 21, and 28; September 4; October 2; November 6 and 20; December 4 and 25, 1886; February 12 and 26; March 19, 1887.

The *Mail and Express*, not long since manufactured a thrilling moral on intemperance, using as its example the supposed intoxicated engineer of the freight train on the Baltimore and Ohio Railroad, with which train the express came in collision near Tiffin, Ohio, last January, with such disastrous results. Now that it has been abundantly proved that the engineer of the freight train was not intoxicated it would be no more than an act of common decency for the *Mail and Express* to undo, so far as possible, the wrong it has done this engineer. This would be a simple act of justice.

Questions and Answers.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common-sense methods.

Every question, to insure any attention, must invariably be accompanied by the writer's name and address. If so requested, neither name, correct initials nor location will be published.

(129) E. H., Ottawa, Ill., asks: How can I harden small finished pieces of cast-iron? *A.*—We do not know of any way that you can do so.

(130) L. K., New Haven, Conn., can only understand the construction of gear teeth by careful study of some book on the subject. It would be impracticable to go into this subject in our Question and Answer column.

(131) B. H. T., Pittsburgh, Pa., asks: What is the formula for finding the nominal horse-power of a steam engine? *A.*—At the present time there is no such thing, at least not in this country, as nominal horse-power.

(132) F. H., New York, asks: What size boiler and cylinder will be required for fair speed with a bicycle with a 48-inch wheel? *A.*—We are not acquainted with any engine for this purpose, and do not feel able for the task of inventing one.

(133) F. S., Toronto, Ont., asks: How can I cut a double thread? *A.*—Cut the space one-half as wide as if a single thread; then cut another thread the same in the stock left. You can divide the space by the dog on the face-plate, or you can mark the teeth on a gear, turn half around and slip into gear again.

(134) G. K. S., Longview, Tex., asks: How can I compute the horse-power of a locomotive? *A.*—Just as you would that of any other double engine, viz., by multiplying the area of one cylinder by the mean effective pressure, by the piston speed in feet per minute, and by two, and dividing by 33,000. The only way to tell what power a locomotive develops is by applying the indicator.

(135) G. E., London, Ont., asks: 1. Will a pump feeding water into a boiler under 60 lbs pressure work as steadily if it has to lift the water 22 feet or as if it were flooded from another pump? *A.*—Generally speaking, 22 feet is too much lift for a boiler feed pump, and a slight leak will cause it to work unsteadily. Our preference would, with cold water, be for a lift of three or four feet rather than have the pump flooded. The pressure against which the pump forces water has nothing to do with the lift if the pump is properly constructed. 2. Where can I get a good book on saw-mill construction? *A.*—We do not know of any book published treating this subject.

(136) E. L. E., Centralia, Ill., writes: 1. I am told that emery is a mineral. Is this so? Also what is corundum? *A.*—Emery and corundum are much alike, and both minerals. You will find very good definitions of both in Webster's Dictionary. 2. Which do the best work, emery or corundum wheels? *A.*—They are about equally good. 3. Will not the gumming material in emery wheels be softened if the wheels are exposed to the action of water? *A.*—Wheels made specially for water are not seriously affected by it. 4. How is emery and corundum made into wheels? *A.*—By gluing under high pressure. 5. What is the reason that the magnetic needle points to the north? *A.*—We do not know.

(137) W. M., Cumberland, Md., asks: 1. What is the probable horse-power of a 16″x24″ engine, cutting off at 14″; steam ports, 15″x1¼″; stroke of valve, 5″; steam pipe, 4½″; exhaust pipe, 5″; throttling governor requiring 110 lbs. of steam to keep up the speed, which is 120 revolutions? *A.*—The way to find out the power developed is to apply an indicator. Anything else is guesswork. We might guess that the engine was developing 175 horse-power. 2. Would not two engines of the above dimensions, with cranks at right angles, do the work more economically? *A.*—No, not engines of the kind you name. 3. Could not the steam pressure be reduced to 60 or 70 lbs. if two engines were used? *A.*—Yes.

(138) L. D., ——, asks: 1. What is a good rule for finding the safe working pressure for a boiler? *A.*—For the circular shell, if longitudinal seams are double-riveted, multiply one-sixth the tensile strength of the material by twice the thickness of sheets, and divide the product by the diameter in inches. Example: Boiler, 40 inches diameter, made of ¼ inch plate having a tensile strength of 50,000 lbs. per square inch of section. One-sixth of 50,000 is 8,333; twice the thickness of plate is ½ inch; 8,333, multiplied by ½, is 4.166, which, divided by 40, gives 104 as the safe pressure. If longitudinal seams are single-riveted, take one-eighth instead of one-sixth the tensile strength of sheets. This supposes all other parts to be as strong as the shell; also that the workmanship is good, and the boiler new or without signs of weakness. 2. How can I find the heating surface of a boiler? *A.*—Calculate all the surfaces in square feet which are exposed to the fire and to the hot gases in their passage to the chimney.

BUSINESS SPECIALS

Transient Advertisements 50 cents a line for each insertion under this head. About seven words make a line Copy should be sent to reach us not later than Wednesday for the ensuing week's issue.

Shafting Straighteners. J. H. Wells, Tampa, Fla.

Edw. Sears, Wood Engraver, 169 William st., N.Y.

Steel Name Stamps, etc. J. B. Roney, Lynn, Mass.

J. Clayton, Air Compressors, Rock Drills, 43 Dey st, NY

Extra capacity, hollow-spindle Hand Lathes; correspondence solicited. J. R. Rand, Brattleboro, Vt.

Light articles built to order by the American Sewing Machine Co., Philadelphia, Pa.

The Best Upright Hammers run by belt are made by W. P. Duncan & Co., Bellefonte, Pa.

R. Dudgeon, 24 Columbia st., New York, Improved Hydraulic Jacks and Roller Tube Expanders.

Pattern and Brand Letters. Vanderburgh, Wells & Co., cor. Fulton and Dutch sts., New York.

Solid Nickel-Seated "Pop" Safety Valves. Consolidated Safety Valve Co., 111 Liberty st., N. Y.

Robbs' Patent Composition for case-hardening; send for circular. F. W. Tasney, Paterson, N. J.

"Bradley's Power Hammers, the best in the world." 20 sizes. Bradley & Co., Syracuse, N. Y.

Davis Key-Seating Machines, kept in stock, by Manning, Maxwell & Moore, 111 Liberty st., N. Y.

20", 25," 28" B G. and S. F. upright drills for immediate delivery. Currier & Snyder, Worcester, Mass.

Ice and Refrigerating Machines. 120 built, and all successful. David Boyle, 521 Monroe st., Chicago, Ill.

Selden Packing, for stuffing-box, with or without rubber core. Randolph Brandt, 38 Cortlandt st., N.Y

Drawing Materials, all kinds. Get catalogue. Mention this paper. G. S. Woolman, 116 Fulton st., N. Y.

The Improved Tabor Steam Engine Indicator, made and sold by The Ashcroft Mfg. Co., 111 Liberty st., N. Y.

Engine Lathes, Hand Lathes, and other fine tools. Assortment large; prices low. Frasse & Co., 92 Park row, N. Y.

Twelve H. P. Upright Engine and four-spindle Drill, first-class, $125 each. The Coulter & McKenzie Machine Co., Bridgeport, Conn.

Machinists' supplies, brass goods, m'f'rs' supplies, polishing materials, all kinds wire, metals, etc.; in any quantity. Jordan & Gottfried, 208 Canal st., N.Y.

For Best Return Steam Traps, Pressure Regulators, Positive-Acting Pump Govs., Back-Pressure Valves. T. Kieley, 11 W. 13th st., N.Y. Send for des'n.

Wanted—Numbers 1, 2 and 4 of AMERICAN MACHINIST for 1881. Will pay 25 cents each for clean copies. AMERICAN MACHINIST PUB'G CO., 96 Fulton st., New York.

Practical Handbook on Pump Construction. Various kinds and materials to be made of for different purposes. By P. R. Bjorling. Nine plates, 12mo., $1.50. E. & F. N. Spon, publishers, 35 Murray street, New York.

New Book on Gears; Tables giving 3,091 diameters, with rules for the calculation of movements of shafts, etc.; sent on receipt of P. O. Note; price 50 cents. Address C. B. Long, M. E., Worcester, Mass.

"Hints to Steam Users, Engineers and Firemen." A 100-page book on care of steam boilers; just issued; containing useful rules, tables, etc.; a valuable book for engineers; sent on receipt of 25 cts. in stamps. J. N. Mills Pub. Co., 30 Vesey st., N. Y.

"Indicator Practice and Steam Engine Economy." By F. F. Hemenway. Contains plain directions for using the indicator, and making all required calculations from the diagram; also the principles of economy in operating steam engines, and current practice in testing engines and boilers. Price, $2 post-paid. Published by John Wiley & Sons, 15 Astor Place, New York.

"Binders" for the AMERICAN MACHINIST. Two styles—the "Common Sense," as heretofore sold by us, and mailed to any address at $1.00 each, and the "New Handy," mailed at 50c. each. The former has stiff board covers, while the latter has flexible covers, the full page opening flat. Either will hold the entire 52 issues of any volume. AMERICAN MACHINIST PUB'G CO., 96 Fulton st., New York.

MANUFACTURES.

The Calera Foundry, Calera, Ala., is being enlarged.

E. P. Chesbro, Willimantic, Conn., will build a carriage factory.

Geo. A. Bullard, Marshall, Mich., will build a furniture factory.

William Corden, of East Richland, O., will establish a woolen factory.

Andrew G. Curtin, Jr., of Bellefonte, Pa., will erect a forty-ton furnace.

Wm. A. Chase, Jr., is interested in a rifle factory to be built at Holyoke, Mass.

The Co-operative Bolt and Nut Works in Reading, Pa., will start with a capital of $80,000.

The new shop of the Union Water Meter Company, Worcester, Mass., will cost $8,000.

Solter, George & Co., of Coatesville, Pa., are making improvements to their boiler works.

Fred. L. Meyers will erect a $9,000 brick factory extension at 520 West 24th street, New York.

It is proposed to build a shoe factory at Hyannis, Mass. Allan G. Baxter can give particulars.

The Elyton Land Company, Birmingham, Ala., will build a round-house and machine shops.

Rohe & Bro. will build a boiler shop at 540 West 37th street, New York, 50x102 feet, to cost $6,000.

The Shawnee Perry County Coal and Iron Company, of New Lexington, O., will erect a furnace.

Chas. Brenz will erect a two-story factory on Filbert, between 36th and 37th streets, Philadelphia.

Hegewald & Co., of New Albany, Ind., are building an addition to their boiler and sheet iron works.

J. & D. Noble, Anniston, Ala., have ordered new machinery to double the capacity of their boiler works.

An effort is being made to establish a blast furnace at Tioga, Pa. The capital stock is to be $100,000.

Moon Bros. will build a factory of brick at Lucas avenue and Seventeeth street, St. Louis. It will cost $20,000.

The Sheffield Velocipede Car Company, of Three Rivers, Mich., will make extensive improvements to its works.

R. N. Hubbard, 319 East 22d street, New York city, will establish agricultural implement works in Boonton, N. J.

L. Raffloer will erect a $40,000 factory at 135 Mulberry street, New York. It will be 50x100 feet, and six stories high.

Henry Rhell will erect a four-story brick factory on 122d street, near Madison avenue, New York, 25x90 feet. It will cost $9,000.

James D. McNeil will build a cotton yarn factory, 40x60 feet, at Fayetteville, N. C. Has purchased the necessary machinery.

The 1,000 employes of the Britton iron and steel works, Cleveland, O., have had their wages increased from 10 to 15 per cent.

Herman Anken & Co., of New York, will erect a $20,000 brick factory at South River, N. J. It will be 50x150 feet, three stories high.

The Pœnix Iron Company is preparing to build a steel mill at Phœnixville, Pa., and has ordered 1,000,000 bricks to construct the furnaces.

Colgate & Co., soap manufacturers, will erect a five-story brick factory, 46x48 feet, at 8 and 10 Dutch street, New York. It will cost $12,000.

The Birmingham Iron Bridge and Forge Company, Birmingham, Ala., will increase their capital stock of $250,000 and add a large rolling mill.

J. W. Friend & Co., W. Carson and Steuben Streets, Pittsburgh, Pa., will convert the rolling mill at Wheatland into large pipe iron works.

The Ames Sword Company, of Chicopee, Mass., have discontinued the manufacture of sword blades, and will hereafter import them from Germany.

A $250,000 machine shop for the Chicago, Kansas and Nebraska Railroad is to be built in the new town of Horton, Brown County.—*Industrial Gazette.*

W. P. Davis, North Bloomfield, N. Y., writes us: "We are having a very good trade. We have just received an order for 52 of our 20" drills from one firm."

G. W. Wheland, Chattanooga, Tenn., is preparing to erect a new building for his foundry and machine works, previously reported. It will be 159x200 feet.

The old rolling mill at Warren, O., is being thoroughly refitted by its new owner, Winslow Alderdice. A new Porter-Hamilton engine is being put in.

The Southern Bridge Company, Birmingham, Ala., are putting in new machinery, and will add boiler works and the manufacturing of bolts, nuts, rivets, etc.

Extensive car works are to be built at Curtis Creek, the new tide-water terminal of the Baltimore and Ohio. The capital stock of the company is $300,000.

Oscar Lynch, Fort Worth, Tex., has organized a company to manufacture cars, and secured a site for the works. He will shortly secure a charter for the company.

The Central and Southwestern Railroad—D. D. Arden, M. M., Savannah, Ga.—has purchased land at Birmingham, Ala., for the location of new shops and round-house.

The erection of a rolling mill at Roanoke, Va., is now being considered by F. J. Kimball, of Philadelphia, president Norfolk and Western Railroad Company, and associates.

A $250,000 company, to build a rolling mill, and a $100,000 company, to build a cotton compress at Sheffield, Ala., are being organized. A. J. Moses and others are interested.

The 325 employes of the Ellis & Lessig Steel and Iron Company, Pottstown, Pa., have been granted an unsolicited advance of 10 per cent. in their wages, dating from March 1.

A. W. Wills, Nashville, Tenn., is president of a new company that will refit the Cypress Cotton Mills at Florence, Ala., with new machinery, and run them with modern improvements.

Henry George & Son, 795 Fourth avenue, Detroit, Mich., have been awarded the contract for erecting a 50x62 feet addition to the Michigan Car Wheel Company's foundry on Foundry street.

Walter Scott & Co., manufacturers of printing presses and machinery, Plainfield, N. J., write us: "We are running day and night with two sets of men, and are constantly adding new tools."

Coopers of Chicago have organized a co-operative factory, with $100,000 capital. No one can hold more than twenty-five shares. They will spend $7,000 for a building and employ 200 men.

The Everett Piano Company is to have a five-story brick factory erected at the corner of Vareham and Albany streets, Boston. It will be built on the latest principles of mill construction.

The Valley Machine Company, Easthampton, Mass., has begun the manufacture of duplex steam pumps, a patent on the valve mechanism having just been granted them, which is said to be very simple.

The proprietors of the Cambria Iron Works at Johnstown, Pa., have notified their employes that wages would be advanced on and after the 16th inst. The advance will affect all employes except salaried men.

Scherpe & Koker, Enterprise Agricultural Iron Works, of St. Louis, are enlarging their works. The moulding department is increased by a building, 50x100 feet, and the finishing and pattern shops 50x80 feet.

It is rumored that the Hartman Steel Company, of Beaver Falls, Pa., has in contemplation the purchase of a portion of the Lower Maria Furnace property, in Taylor township, Beaver County, with the intention of erecting thereon steel works.

The foundry of A. W. Hager & Co., Charleston, W. Va., was destroyed by fire on the 16th of February. They have since bought the George Davis foundry and machine shop, and are doing business under the firm-name of Lucadoe & Hager, Jas. F. Hager retiring.

The Rome Foundry and Machine Works, Rome, Ga., will build a new foundry and machine shop this spring. The main building will be 175x56 feet. They will add some new tools, such as lathes, planer, shaper and drill press, and some hand tools and foundry and smith-shop blower.

John H. Sawyer, of Oldtown, Me., has contracted with Hersey & Hill to build their new mill at Vanceboro. The mill will be 175 feet long by 50 feet wide, making the largest mill between the St. Croix river and Bangor. Power will be furnished by two engines—one of 150 horse-power, and one of 75 horse-power.

The firm of Weston & Smith, Syracuse, N. Y., has been dissolved, and I. A. Weston & Co. have succeeded to the business. They write us they have a large amount of work ahead on special machinery, including some machines for canceling stamps and postmarking letters, calculated to stamp 400 per minute.

The negotiations that have been pending for several weeks with a view to the turning of Noble Bros. & Co.'s machine shops and rolling mill at Anniston, Ala., into a $1,000,000 stock company to erect immense works, have not yet, it is said, been fully consummated, though it is reported that the prospects are favorable.—*Baltimore Manufacturers' Record.*

At the annual meeting of the Pratt & Whitney Company, of Hartford, Conn., F. A. Pratt, Amos Whitney, R. F. Blodgett, M. W. Graves, A. S. Cooke, H. C. Robinson, Rowland Swift, S. W. Bishop and J. M. Allen were elected directors for the ensuing year, being the old board with the exception that Mr. J. M. Allen was added to the list. At a subsequent meeting of the directors Mr. F. A. Pratt was elected president; R. F. Blodgett, secretary; and M. W. Graves, treasurer.

Since the Board of Trade of New London, Conn., was established, two years ago, it has been the means of bringing the Oneco Machine Company, which also furnishes the electric lights to the city; the Hopson & Chapin Bronze Manufacturing Company; the Babcock Printing Press Company, located at the Brown Cotton Gin Manufactory; Palmer Brothers' bed-quilt manufactory, employing from 150 to 200 women and girls. Besides these the Board is at present in correspondence with a Hartford steel manufacturer, who appears to recognize the advantages offered by New London, not only for manufacturing cheaply, but for the convenience of shipping.

Our foundry contributor, Thomas D. West, writes us from Cleveland, O., that he has severed his connection as foreman of the foundry of the Cleveland Shipbuilding Company, to go into the foundry business for himself. He has associated with him Samuel Landsdowne, a moulder, and Charles Neracher, a patternmaker. They have formed the Thos. D. West Foundry Company, and have an acre of ground in the most central portion of the best business part of the city, near the C. & P. Railroad track. On this ground they are erecting a new foundry, and will have a switch to connect with the railroad. They will make any kind of iron casting ordered, either heavy or light, and propose to turn out the very best work that can be done. Mr. West's well-known ability in this line ought to be a guaranty of success.

The sales of boilers, made by the Babcock & Wilcox Company, during February, 1887, were as follows: F. Probst & Co, New York city (for export), fifth order, 82 horse-power; Wise Bros., Baltimore, Md., 102 horse-power; J. & R. Melly, ironmasters, Lebanon, Pa., 208 horse-power; Lickdale Iron Company, Lickdale, Pa., 450 horse-power; Forest City Sugar Refining Company, Portland, Me., second order, 140 horse-power; Columbia Rolling Mill Company, Watts, Pa., 136 horse-power; Mahoning Rolling Mill Company, Danville, Pa., second order, 125 horse-power; Arlington Mills, Lawrence, Mass., 2,880 horse-power; Gordon, Strobel & Laureau, Limited, Philadelphia, Pa., third order, 45 horse-power; the Alabama and Tennessee Coal and Iron Company, 1,872 horse power; Judson Manufacturing Company, San Francisco, Cal., second order, 292 horse-power—making a total of 6,332 horse-power.

The new cotton oil company which is to compete in the manufacture of cotton-seed oil with the Oil Trust Company was chartered in Camden, N. J., March 5, with these officers: President, Henry C. Butcher, of Washington Butcher's Sons, of New York city; manager, Frederick Oliver, of Oliver Brothers, Columbia, S. C.; secretary and treasurer, John Oliver, of the same firm; engineer, David A. Tompkins, of D. A. Tompkins & Co., Charlotte, N. C. The capital is $5,000,000, of which $4,000,000 has already been subscribed by Philadelphia capitalists. The company is authorized to build mills at Norfolk, Va.; Wilmington, N. C.; Charleston and Columbia, S. C.; Savannah, Macon, Augusta and Atlanta, Ga.; Mobile, Montgomery, Demopolis and Sheffield, Ala.; Jackson and Meridian, Miss.; New Orleans and Shreveport, La.; Memphis, Tenn.; Houston, Galveston, Dallas, San Antonio, Tex.; Little Rock, Ark.; and refineries at Kansas City, Chicago, Philadelphia, Camden, Jersey City and Hoboken.

The Heudey Machine Company, of Torrington Conn., have issued a fine illustrated catalogue of machinists' tools and special machinery made by them. Planers, shapers, drills, lathes, shaper vises and other tools are shown by cuts and described. In the introduction they say: "It has been our aim to keep our tools up to a high standard of excellence. Racks and gears are cut from the solid metal. Sliding surfaces are accurately scraped to a bearing, no emery being used. Nuts, screws and wrenches are case-hardened. All actuating screws and spindles of lathes and drill presses are of steel. Many improvements have been made within the past year, and we shall avail ourselves of every device offered that will add to their usefulness and convenience." A foundry has recently been added, with capacity to do outside work in addition to their own.

Gould & Eberhardt, Newark, N. J., have recently booked orders for entirely automatic gear-cutters from Potter Printing Press Company, Plainfield, N. J., two machines: Brown Cotton Gin Company, New London, Ct.; Weed Sewing Machine Company, Hartford, Ct.; American Sewing Machine Company, Philadelphia, Pa.; Willets Mfg. Company, Providence, R. I.; Stiles & Parker Press Company, Middletown, Ct., each one machine. Sir William Armstrong, of England, recently received an 84" machine, which is capable of cutting 2½" circular pitch in forged steel, 12" face, with two cutters at one cut. These machines are in successful use in Spain, France, Switzerland, Germany and England—a total of nearly 100 machines—and are receiving the highest praise by expert judges of automatic machinery. Their new automatic drill press, which is built in four sizes, is gaining approval wherever it goes. Gould & Eberhardt are quite successful in introducing improved machinists' tools, and are very busy with work.

One of the most important enterprises inaugurated since the war in Georgia is now under headway, and is being pushed with much vigor and determination by a syndicate composed of the presidents of two banks and ten others of the most substantial citizens of the State, they having purchased seventeen (17) thousand acres of the choicest mineral and agricultural land in Georgia. It is located on the Etowah river, three miles from Cartersville, and about fifty miles from Atlanta. The company is organized as "The Etowah Iron and Manganese Company," and work will be commenced at once. The character of the minerals to be found is mostly iron and manganese. The manganese is of the best quality, samples of which yield 55 per cent. of manganese metal. There is enough to supply the most exorbitant demands. They will establish a million-dollar rolling mill for the manufacture of steel rails, and other mills for the production of merchant and bar-iron. Atlanta has marked a new era in the education of the South by establishing a school of technology, which will be equal to any in the country, it is expected. It starts with a capital of $135,000. The State of Georgia appropriated $65,000, and the city of Atlanta $70,000, with an annuity of $25,000. Work on the buildings is now progressing towards rapid completion.

The Tredegar Company, Richmond, Va., are running full in their four foundries. They have just closed a contract to make the locomotive and car castings for the Eastern division of the old C. & O. R.R. (now the N. N. & M. V. R.R.) until March, 1888. Orders have been placed in the general foundry for castings for one complete 10" rolling mill, one single and one double gas furnace, three spike machine, and a bending machines besides their regular mill and jobbing work. The pipe foundry is running time and a half, as they have contracted to furnish the Richmond Water-Works Department with a large number of standard pipes from 4" to 20" diameter. The car-wheel foundry has cast a heat of wheels every day for the past six months, and have orders ahead. The brass foundry, like the rest, has made full time all winter. These foundries are prepared for the heaviest class of work. They have five cupolas and three air furnaces, and when running full their output is in the neighborhood of a million pounds of castings per week. They have a large number of hand and power cranes, three of them (two 25-ton and one 20-ton center) to one pit. Their pits range in sizes from 8 feet diameter and 10 feet deep to 16 feet diameter and 21 feet deep. In November and December 185 men were employed in the four foundries, under the supervision of our foundry contributor Robert E. Masters. The spike mills, rolling mills and horse-shoe department have made double time all winter, with no prospect of a let-up, as they are making additions to these departments.

Machinists' Supplies and Iron.

NEW YORK, March 10, 1887.

Iron—Transactions in American pig continue moderate in character, yet they appear to be of sufficient magnitude to prevent accumulation of stock. Contract deliveries are considerable, and these help to absorb the output. No. 1 X Foundry, standard brands, sell at $21.50 to $22.50; No. 2 X, $20 to $20.50; Grey Forge, $18 to $18.50.

✲WANTED✲

"Situation and Help" advertisements only inserted under this head. Rate, 3c. cents a line for each insertion. About seven words make a line. Copy should be sent to reach us not later than Wednesday morning for the ensuing week's issue.

Wanted—First-class patternmaker. Inquire of or address Carlos Holly, Lockport, N. Y.

A first-class pract. and theoret. draftsman and engineer wants position; can take charge of drawing room. Address M. E. & D., AM. MACHINIST.

Mechanical draftsman, experienced in machine tools and special machinery, desires situation. Address A. Y., AM. MACHINIST.

Wanted—Position as foundry foreman by a competent man 15 years foreman; iron and brass. Address Moulder, AM. MACHINIST.

A first-class draftsman on special machinery and tools; also young man experienced in Pat. Office drawings. I. A. Weston & Co., Syracuse, N.Y.

Wanted—A competent draftsman; one acquainted with printing machinery preferred. Address, stating age, experience and salary expected, Box H, Plainfield, N. J.

A draftsman and designer, of long experience on steam and general machinery, is in search of a good situation, South or West. Address E. F. J., AM. MACHINIST.

A young man wants a position as designer and draftsman on special machinery; is a good mechanic educated for the business. Address O. S. U., AM. MACHINIST.

Wanted—A competent foreman boilermaker to take charge of a large shop, manufacturing portable, stationary and marine boilers. Address Roberts, care AM. MACHINIST.

Boilermaker—To do laying out and assist foreman at the Oil City Boiler Works: must be sober, steady and energetic. Address, giving age, experience and wages expected, Jas. Barclay, Supt., Oil City, Pa.

Young man, 4¾ yrs. shop experience, can make good working drawings, desires situation as asst. in drawing office; present wages not so important as future advancement and experience to be gained. Address for references, Junius, AM. MACHINIST.

Wanted—Position as foreman or superintendent of machine shop by a young man with 7 yrs'. experience as foreman and supt.; familiar with all kinds engines, boilers and general mach'y; strictly steady and reliable; first-class references. Address J. S. Ward, Cincinnati, Ohio (gen'l delivery).

A Brooklyn manufacturer of machinery, with an established and growing business, would like to form a partnership with a man who has a knowledge of machinery, and who has first-rate business ability. Address J. B., AM. MACHINIST.

A competent man, with good experience in the best machine tool shops and drawing rooms, and in sewing machine and other shops, is looking for a leading position; East preferred; intelligent service rendered and fair compensation expected. Address "Adams," AM. MACHINIST.

Wanted—Position as business manager or treasurer of a manufacturing or finance corporation, by an active business man of over sixteen years' experience; thoroughly competent to organize a new business or carry on one already established. Address T. W. J., care of AM. MACHINIST, 96 Fulton st., New York city.

Wanted—New York agency for meritorious specialty having good reputation, by mechanical engineer who is quick draftsman, has a shop, a superintending and a selling experience aggregating 25 years; honorable, energetic, with extensive useful acquaintance, or would connect with large house. Address Sal. and Com., Box 13, AM. MACHINIST.

✢ MISCELLANEOUS WANTS. ✢

Advertisements will be inserted under this head at 35 cents per line, each insertion.

Crescent steel tube scrapers are unquestionably the best. Crescent Mfg. Co., Cleveland, Ohio.

Crescent boiler tube cutter, for setting new and removing old tubes. Crescent Mfg. Co., Cleveland, O.

Light mach'y of all kinds built at short notice Edmund Mills, 8 Dey st., Jersey City Heights, N. J.

Special tools and machines for mfg. designed and built to order; mechanical and Patent Office drawings. I. A. Weston & Co., Syracuse, N. Y.

For Sale—One 1⅛" Merriman bolt-cutter, one 20' swing, 12 ft. bed, engine lathe, both new. The McLagon Foundry Co., New Haven, Ct.

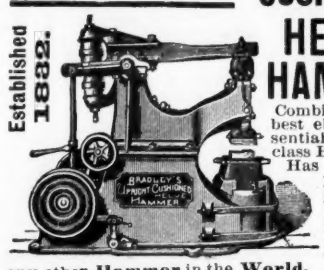
For Sale—One Lathe, 28" swing, 20 feet between centers; one jig saw, one wood-turners' lathe. A. L. Henderer, Wilmington, Del.

For Sale—Low figure, in good order, four stationary engines—one each of thirty-five, forty, fifty and sixty horse-power. Address Pratt & Letchworth, Buffalo, N. Y.

An English manufacturing firm, with old-established connections all over Europe, and ample capital, desires to meet with a manufacturer of goods suitable to sell with their own to ironmongers, engineers, ship and house-builders, etc. A member of the firm will be in the U. S. in March and interview respondents. Address T. H. W., Room 87, Drexel Building, New York.

For Sale—Valuable Manufacturing Property, centrally located in one of the largest Western States, with a well-established reputation for the goods of its manufacture, which consist of engines, boilers, saw and grist mill machinery, and kindred articles. Property all in first-class condition; tools and machinery in good order, and the works now running. Parties who mean business, and desire to engage in a profitable and well-established business of this character, can get full particulars by writing or applying in person to M. D. Wheeler, Stapleton, Staten Island, N. Y., or Manning, Maxwell & Moore, 111 and 113 Liberty st., New York.

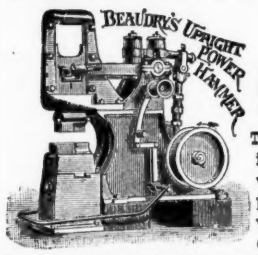
BRADLEY'S UPRIGHT CUSHIONED HELVE HAMMER



Combines all the best elements essential in a first-class Hammer. Has more good points, does more and better work and costs less for repairs than any other Hammer in the World.

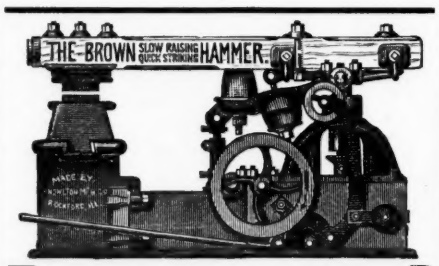
BRADLEY & CO. Syracuse, N.Y.

BEAUDRY'S UPRIGHT CUSHIONED POWER HAMMER



The success of our machine is the best guarantee of its value. Only hammer with patent Duplex Steel Helve which never rattles, burns or breaks. Guaranteed to do more and better work with less repairs than any other.

BEAUDRY & CUNNINGHAM, Boston, Mass.



THE BROWN HAMMER
STRIKES A BLOW WITH
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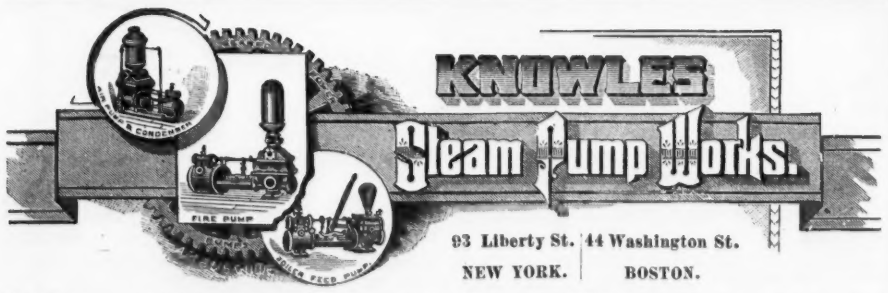

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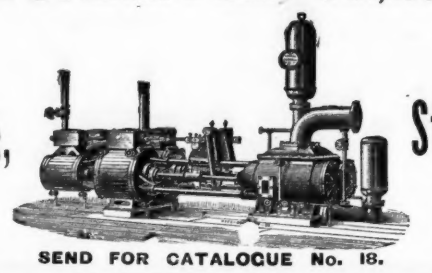

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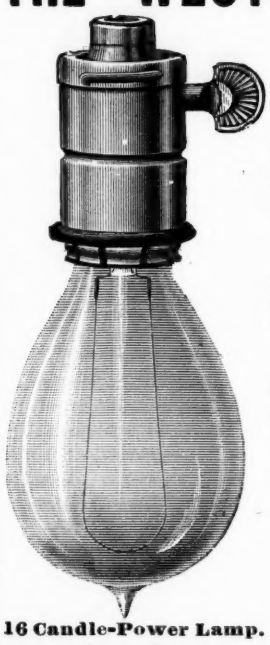

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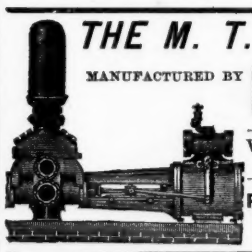

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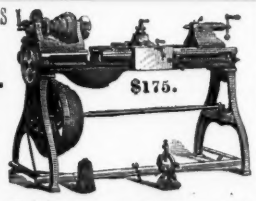

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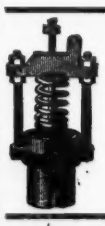

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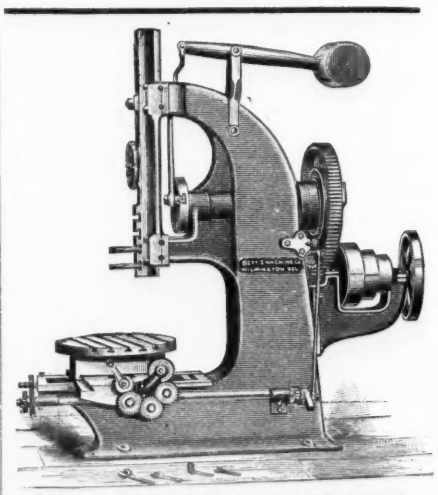

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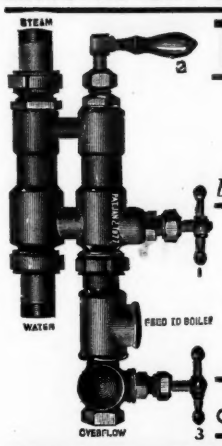

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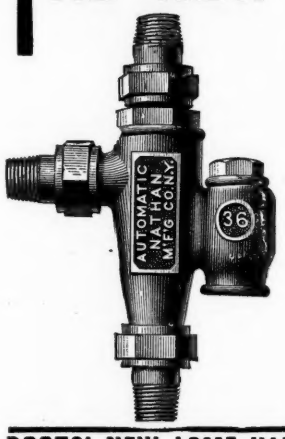

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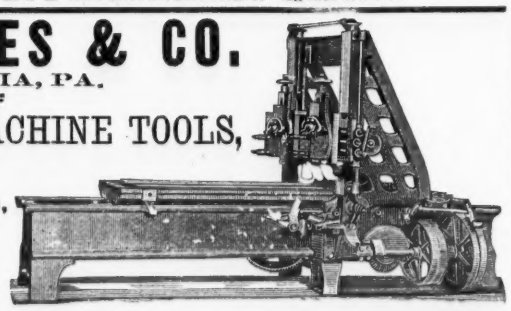

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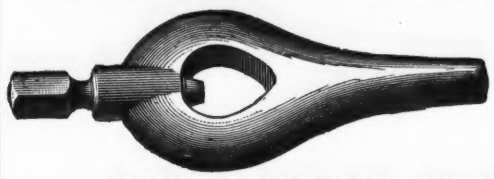

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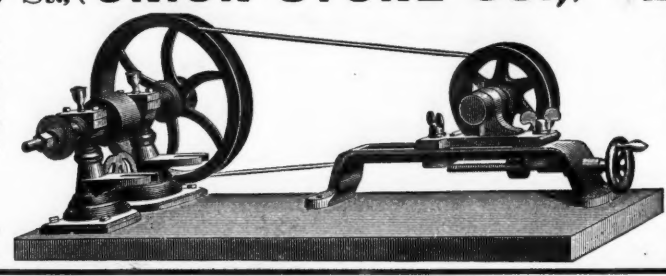

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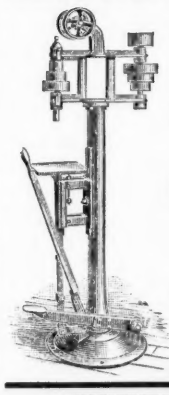

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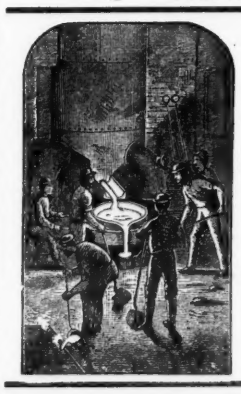

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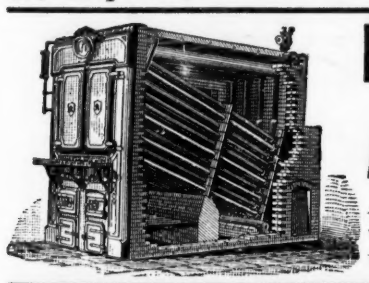

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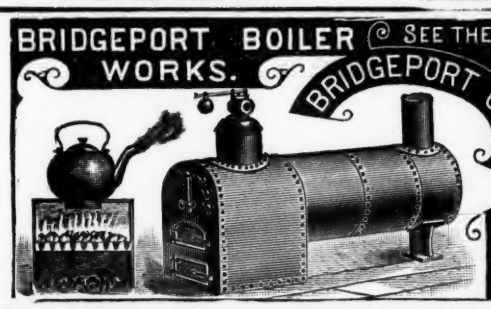

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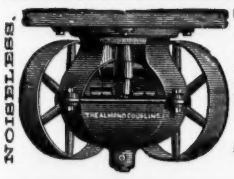
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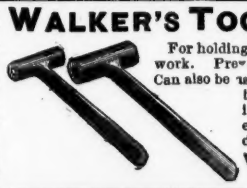
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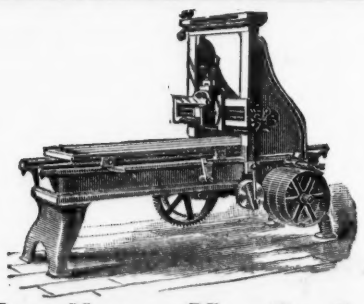
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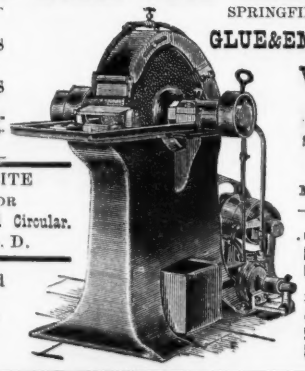
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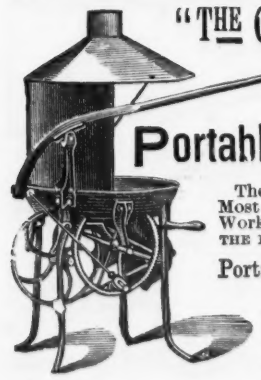
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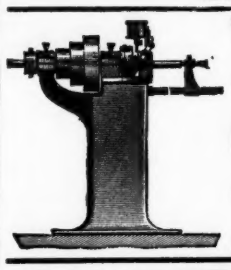
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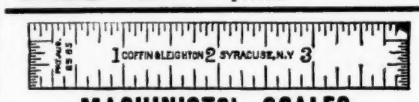

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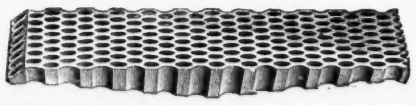
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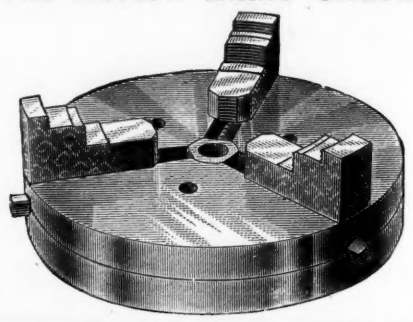
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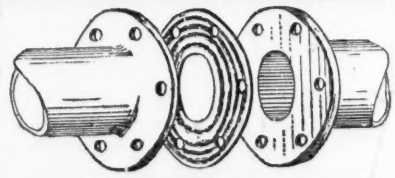

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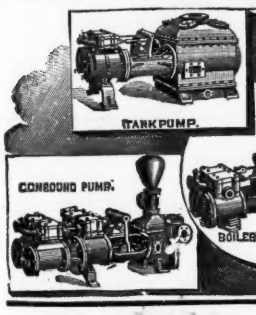

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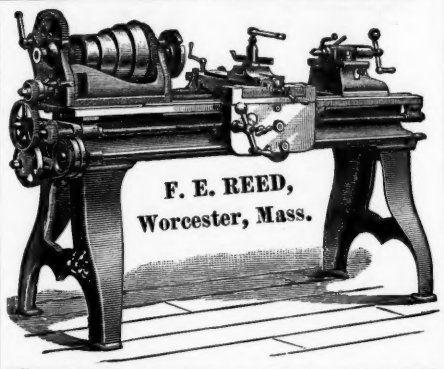

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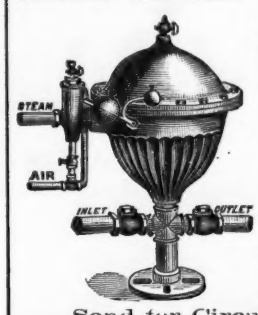

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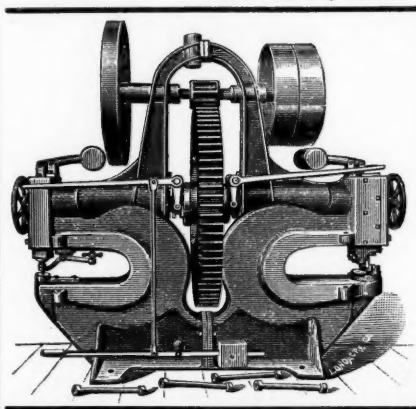

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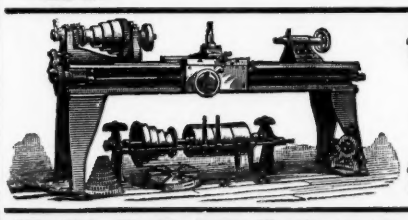

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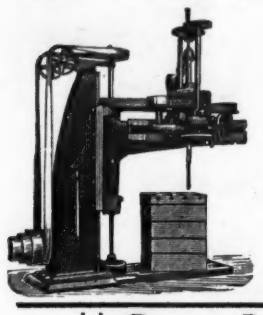

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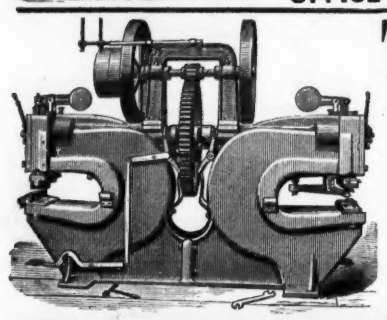

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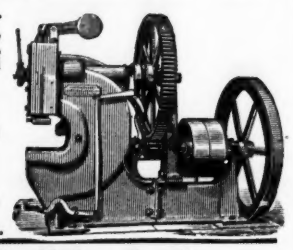

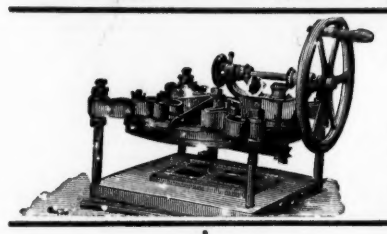

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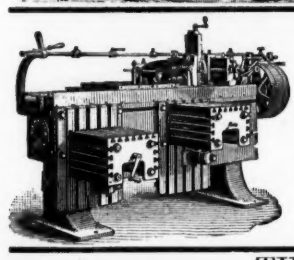

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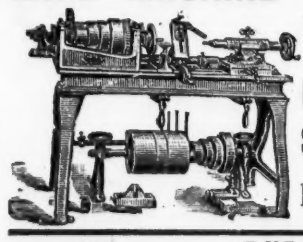

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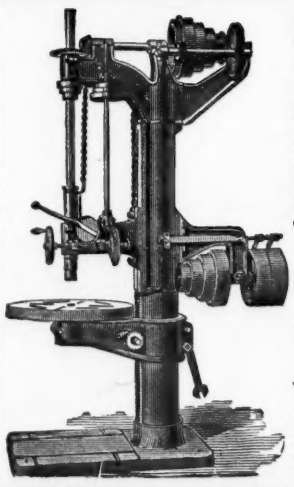

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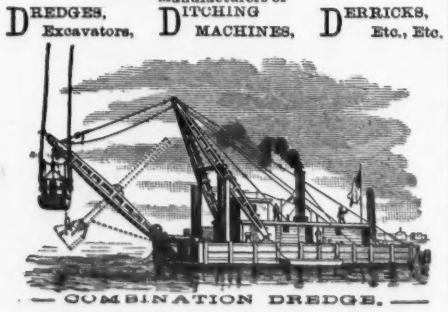

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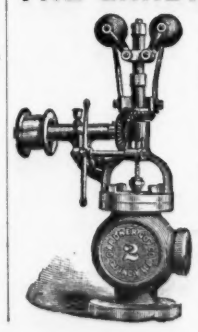

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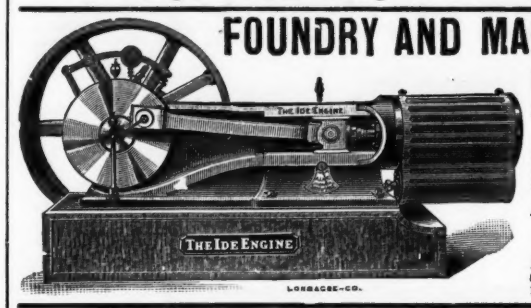

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Beware of Imitations. Sold in Bags of 110 lbs. each.

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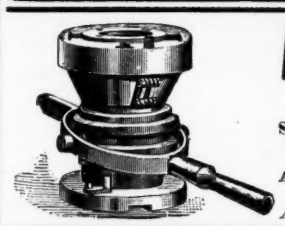

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Single & Double Automatic Boltcutters,

cutting from 3-8 in. to 6 in. diameter,

Also SEPARATE HEADS AND DIES.

Send for Catalogue and Discounts.

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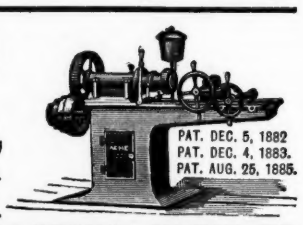

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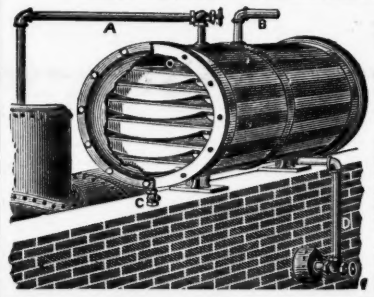
Heater and Lime Extractor.

CLEAN BOILERS GUARANTEED.



THE HOPPES MFG. CO. SPRINGFIELD, O. —Send for Catalogue D.—

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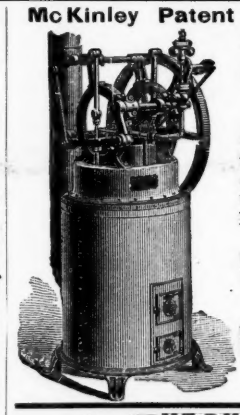

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No Steam. No Water. Absolute Safety. No Engineer. No pumps. No Gauges. No liability to freeze up. No Regulation required.

NO EXTRA INSURANCE.

Can be used for any purpose where power is required.

Cheap Fuel. Cheap First Cost.

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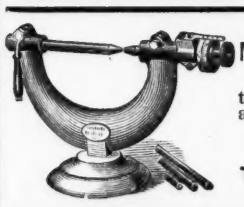

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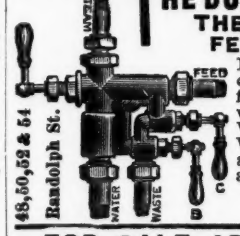

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Not liable to get out of order. Will lift water 25 feet. Always delivers water *hot* to the boiler. Will start when it is hot. Will feed water through a heater. Manufactured and for sale by

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MANUFACTURED BY

THE LEEDS FORGE CO., Limited, of England.

SAMSON FOX, C. E., Manager.

Best Yorkshire Steel (Siemens') Boiler Plates.

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MACHINERY.

New and Second Hand at great bargains.

Two	16"	swing,	6'	bed,	Engine Lathes (Porter),	new.
One	17"	"	8'	"	" (Wright),	"
"	24"	"	12'	"	" "	"
"	18"	"	8'	"	" second hand.	
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"	30	Swing Upright Drill (More & Wyman)				"
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"	25	"	"	"	10"x12"	" "
"	20	"	"	"	9"x16"	"sd. hd.
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"	30	"	Portable	"	10"x16'	" new.
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CAMPBELL & MURPHY,

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BY

POOLE & HUNT, Baltimore, Md.

1 Planing Machine. Will plane 35 in. wide, 27 in. high, and 16 ft. in. long.
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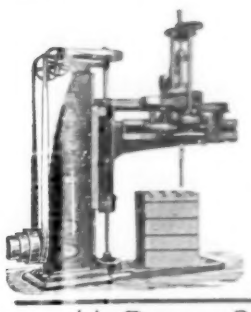

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Engineers and Manufacturers of

IMPROVED MACHINE TOOLS FOR WORKING IRON AND STEEL

STEAM HAMMERS, PUNCHES and SHEARS, LATHES, PLANERS, BENDING ROLLS, BORING and TURNING MILLS. DRILL and TOOL GRINDERS, Etc., Etc.

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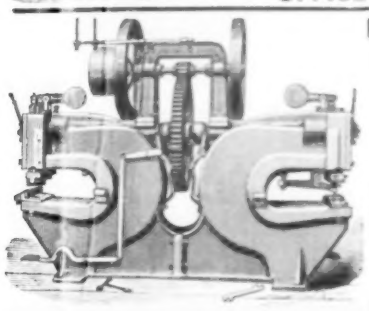

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Double, Single, Angle-Bar, Gang, Horizontal, Twin, Boiler, Spacing, Gate, Multiple, Belt and Steam-Driven

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ALSO,

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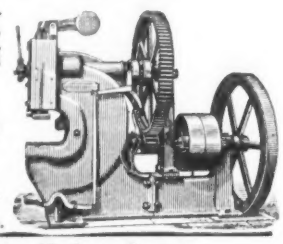

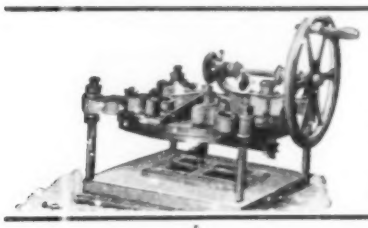

Patent Portable Valve Seat Rotary Planing Machine.

Will Plane off the Valve Seats of Locomotive and other Engines without the use of files or scrapers.

Circulars with full description on application.

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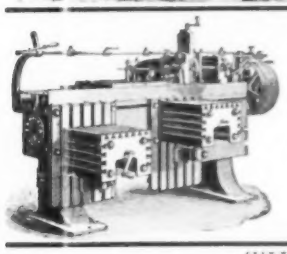

Philadelphia, June 2d, 1886.

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At Powers & Weightman's Laboratory,
Falls Schuylkill, Phila.

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Adapted to rapid work with small drills. Its extreme sensitiveness prevents clogging and breakage of drills. Has a switching table with attachment for center drilling. Instantly adjustable to different lengths of work. Over 200 already in use. Send for circular

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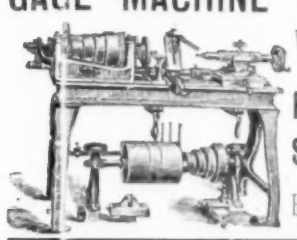

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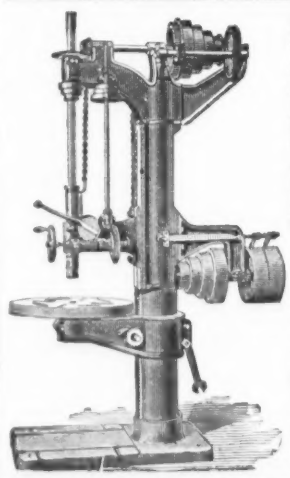

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ALL SIZES WITH PATENT GUIDE RETURN-HEAD AND ALL MODERN IMPROVEMENTS,

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THE NATIONAL *FEED-WATER* HEATER.

A brass coil heater supplying feed water at 210° to 212° Fahrenheit by use of exhaust steam.

Our prices are low and reasonable, and we aim to supply the *cheapest, best and most effective Heater in the market.* Sixteen sizes. 10 H.P., $20; 100 H.P., $150; 500 H.P., $600. Iron, Brass and Copper Coils and Bends made to order. Circulars and price lists sent on application.

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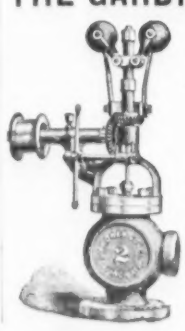

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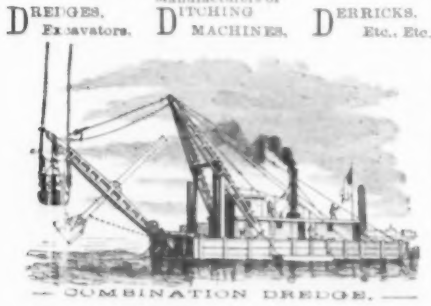

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Heavy Machinery of all Kinds a Specialty.

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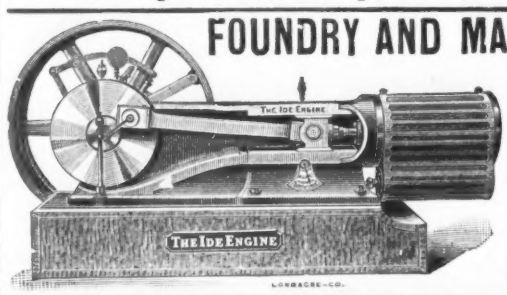

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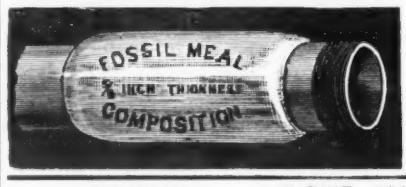

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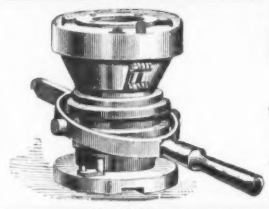

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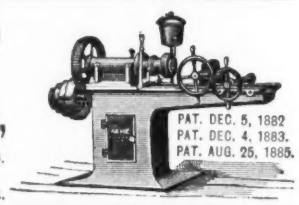

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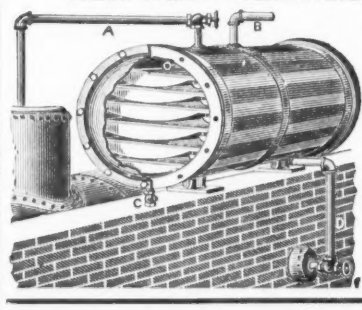

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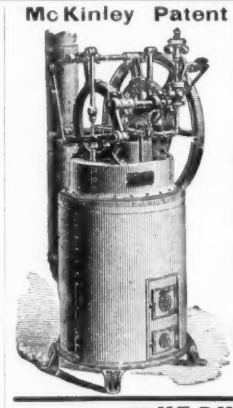

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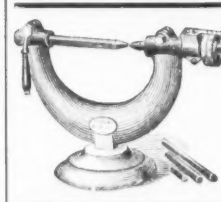

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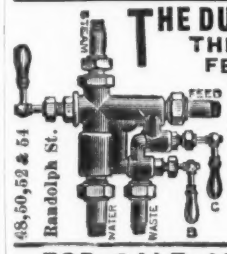

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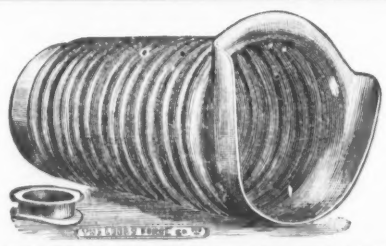

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1 Double Geared Chasing Lathe. Will swing 24 in. dia., 8 ft. 6 in. long.
1 Drill Grinding Machine. Made by Wm. Sellers & Co.

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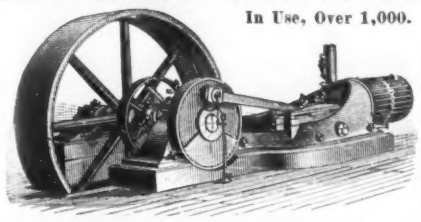

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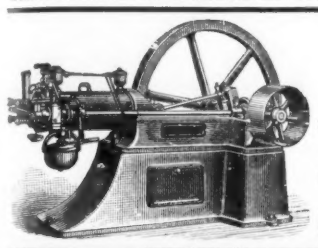

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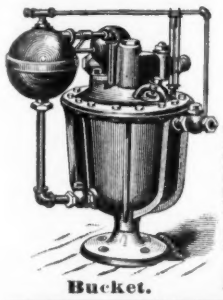

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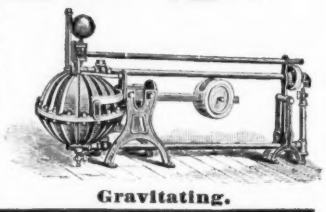

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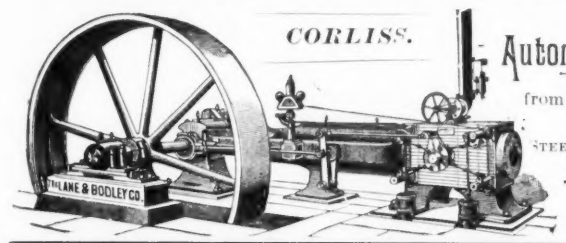

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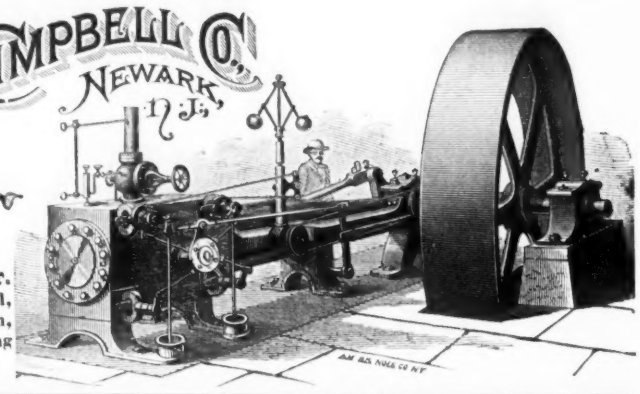

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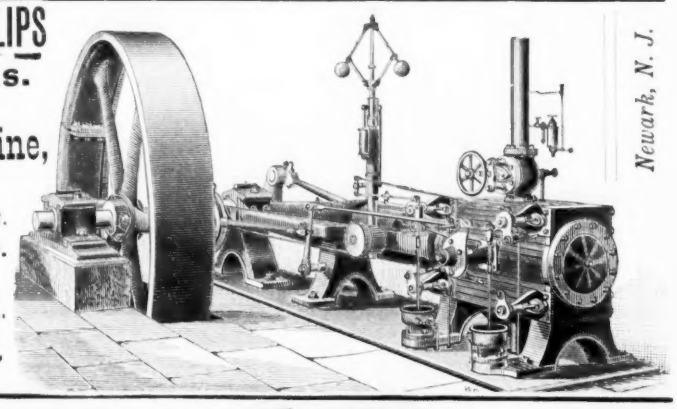

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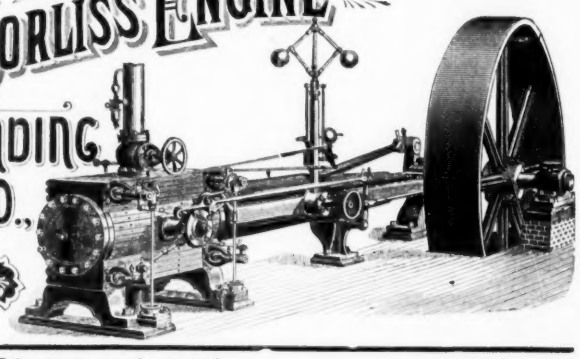

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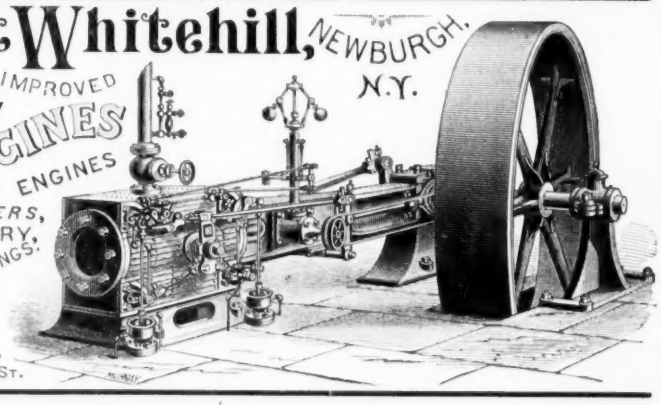

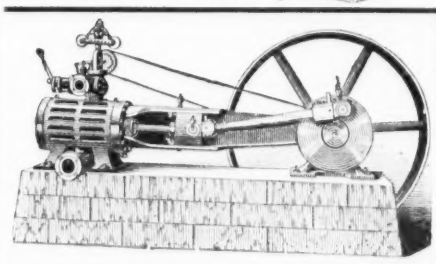

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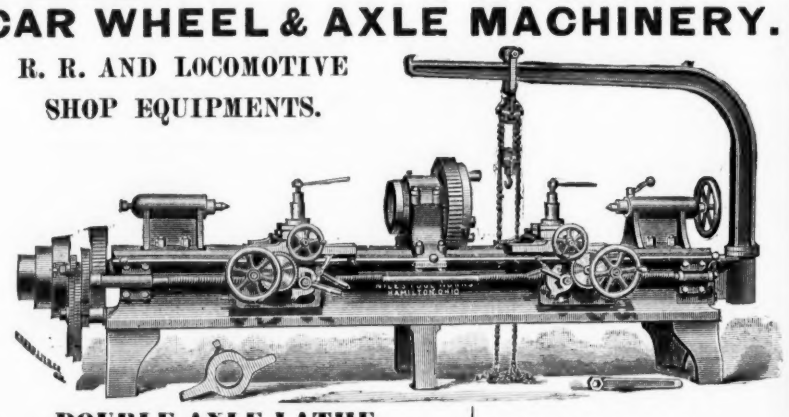

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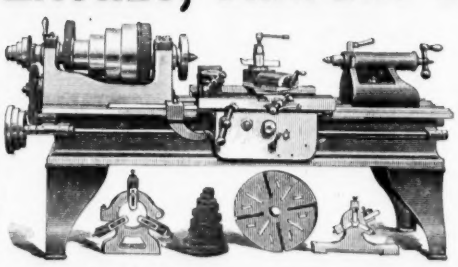

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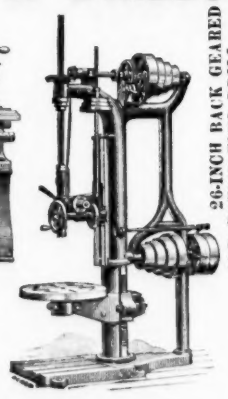

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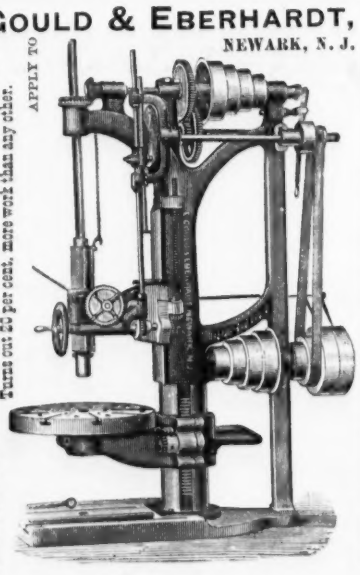

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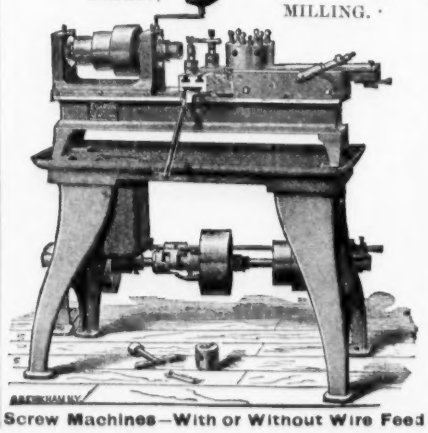

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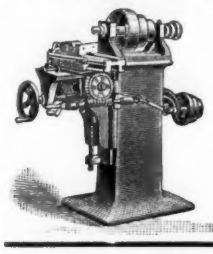

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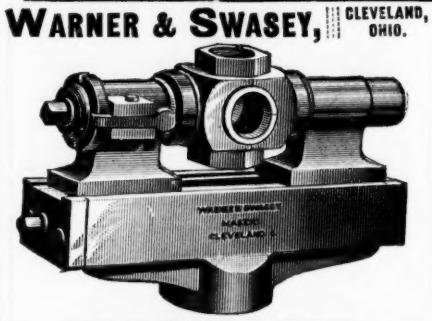

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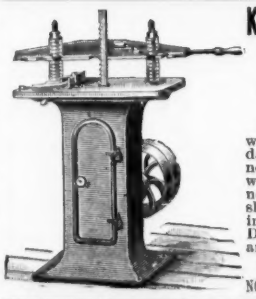

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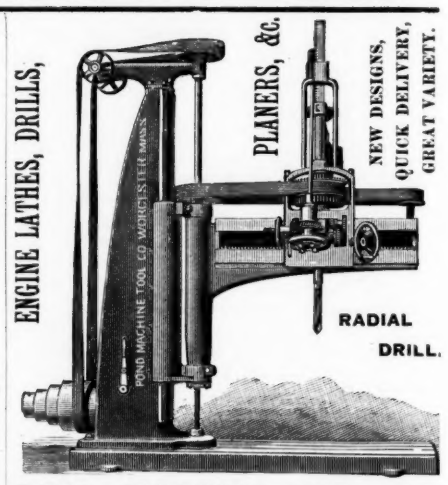

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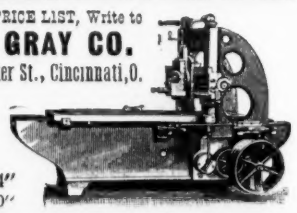

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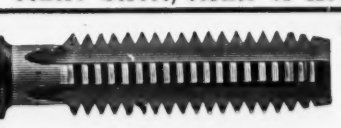

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